# References

Achtziger, W., Bendsøe, M. P., Ben-Tal, A., and Zowe, J. (1992). Equivalent displacement based formulations for maximum strength truss topology design, *Impact of Computing in Science and Engineering* **4**(4): 315–345. {*404*}

Allaire, G., Bonnetier, E., Francfort, G. A., and Jouve, F. (1997). Shape optimization by the homogenization method, *Numerische Mathematik* **76**(1): 27–68. {*386, 395, 405*}

Allaire, G., and Kohn, R. V. (1993a). Explicit optimal bounds on the elastic energy of a two-phase composite in two space dimensions, *Quarterly of Applied Mathematics* **LI**(4): 675–699. {*395*}

Allaire, G., and Kohn, R. V. (1993b). Optimal bounds on the effective behavior of a mixture of two well-ordered elastic materials, *Quarterly of Applied Mathematics* **LI**(4): 643–674. {*395*}

Allaire, G., and Kohn, R. V. (1993c). Optimal design for minimum weight and compliance in plane stress using extremal microstructures, *European Journal of Mechanics, A, Solids.* **12**(6): 839–878. {*461*}

Allaire, G., and Kohn, R. V. (1994). Optimal lower bounds on the elastic energy of a composite made from two non well-ordered isotropic materials, *Quarterly of Applied Mathematics* **LII**(2): 311–333. {*395, 405*}

Armand, J., Lurie, K. A., and Cherkaev, A. V. (1984). Optimal control theory and structural design, in E. Atrek, R. H. Gallagher, K. M. Ragsdell, and O. C. Zienkeiwicz (eds), *New Directions in optimal structural design*, John Wiley and Sons, New York; London; Sydney, pp. 211–229. {*67, 461*}

In this bibliography, each entry is followed by a braced list of page numbers in small *italic* type, showing where in the book the entry is cited.

Arora, J. S. (1998). Optimization of structures subject to dynamical loads, in C. T. Leondes (ed.), *Structural Dynamical Systems: Computational Technologies and Optimization*, Gordon and Breach Science Publ., pp. 1–73. {*466*}

Astala, K., and Miettinen, M. (1998). On quasiconformal mappings and 2-dimensional *G*-closure problems, *Archive for Rational Mechanics and Analysis* **143**(3): 207–240. {*294, 309, 341*}

Atkin, R. J., and Fox, N. (1990). *An Introduction to the Theory of Elasticity*, Longman, London. {*359*}

Avellaneda, M. (1987a). Iterated homogenization, differential effective medium theory, and applications, *Communications on Pure and Applied Mathematics (New York)* **40**: 803–847. {*183*}

Avellaneda, M. (1987b). Optimal bounds and microgeometries for elastic two-phase composites, *SIAM Journal on Applied Mathematics* **47**(6): 1216–1228. {*425*}

Avellaneda, M., Cherkaev, A. V., Gibiansky, L. V., Milton, G. W., and Rudelson, M. (1996). A complete characterization of the possible bulk and shear moduli of planar polycrystals, *Journal of the Mechanics and Physics of Solids* **44**(7): 1179–1218. {*364–366, 389, 449, 452*}

Avellaneda, M., Cherkaev, A. V., Lurie, K. A., and Milton, G. W. (1988). On the effective conductivity of polycrystals and a three-dimensional phase interchange inequality, *Journal of Applied Physics* **63**: 4989–5003. {*214, 269, 293, 294*}

Avellaneda, M., and Milton, G. W. (1989a). Bounds on the effective elastic tensor of composites based on two-point correlations, in D. Hui, and T. J. Kozik (eds), *Composite Material Technology*, ASME, pp. 89–93. {*384, 467, 468*}

Avellaneda, M., and Milton, G. W. (1989b). Optimal bounds on the effective bulk modulus of polycrystals, *SIAM Journal on Applied Mathematics* **49**(3): 824–837. {*385, 451, 468*}

Backus, G. E. (1962). Long-wave elastic anisotropy produced by horizontal layering, *Journal of Geophysical Research* **67**: 4427–4440. {*42, 180*}

Backus, G. E. (1970). A geometrical picture of anisotropic elastic tensors, *Reviews of Geophysics and Space Physics* **8**: 633–671. {*370*}

Bakhvalov, N. S., and Knyazev, A. (1994). Fictitious domain methods and computation of homogenized properties of composites with a periodic structure of essentially different components, in G. I. Marchuk (ed.), *Numerical Methods and Applications*, CRC Press, Boca Raton, pp. 221–276. {*47*}

Bakhvalov, N. S., and Panasenko, G. P. (1989). *Homogenization: Averaging Processes in Periodic Media*, Kluwer Academic Publishers Group, Dordrecht/Boston/London. {*xxiii, 45, 47*}

Balk, A., Cherkaev, A. V., and Slepyan, L. I. (1999). Dynamics of solids with non-monotone stress-strain relation, *Journal of the Mechanics and Physics of Solids* **submitted**. {*47*}

Ball, J. M. (1989). A version of the fundamental theorem for Young measures, *PDEs and continuum models of phase transitions (Nice, 1988)*, Vol. 344 of *Lecture Notes in Phys.*, Springer-Verlag, Berlin; New York, pp. 207–215. {*164, 321*}

Ball, J. M., Currie, J. C., and Oliver, P. J. (1981). Null-lagrangians, weak continuity, and variational problems of arbitrary order, *Journal of Functional Analysis* **41**: 4989–5003. {*150*}

Ball, J. M. (ed.) (1988). *Material instabilities in continuum mechanics: related mathematical problems: the proceedings of a symposium year on material instabilities in continuum mechanics*, Oxford University Press, Walton Street, Oxford OX2 6DP, UK. {*321*}

Ball, J. M., and James, R. (1987). Finite phase mixtures as minimizers of energy, *Archive for Rational Mechanics and Analysis* **100**: 13–52. {*321*}

Ball, J. M., and Murat, F. (1984). $W^{1,p}$-quasiconvexity and variational problems for multiple integrals, *Journal of Functional Analysis* **58**(3): 225–253. See errata (Ball and Murat, 1986). {*150, 158, 218*}

Ball, J. M., and Murat, F. (1986). Erratum: "$W^{1,p}$-quasiconvexity and variational problems for multiple integrals", *Journal of Functional Analysis* **66**(3): 439. {*499*}

Ball, J. M., and Murat, F. (1991). Remarks on rank-one convexity and quasiconvexity, *Ordinary and partial differential equations, Vol. III (Dundee, 1990)*, Longman Sci. Tech., Harlow, pp. 25–37. {*155, 158*}

Bandle, C. (1980). *Isoperimetric inequalities and applications*, Pitman (Advanced Publishing Program), Boston, Mass. {*479*}

Banichuk, N. V. (1977). Conditions of optimality in the problem of finding shapes of holes in elastic bodies, *Prikladnaia Matematika i Mekhanika (PMM)= Applied Mathematics and Mechanics* **41**(5): 920–925. {*412, 461*}

Banichuk, N. V., Bel′skiĭ, V. G., and Kobelev, V. V. (1984). Optimization in problems of elasticity with unknown boundaries, *Izvestiia Akademii Nauk SSSR. Mekhanika Tverdogo Tela* **19**(3): 46–52. {*412, 414*}

Beliaev, A. Y. A., and Kozlov, S. M. (1996). Darcy equation for random porous media, *Communications on Pure and Applied Mathematics (New York)* **49**(1): 1–34. {*47*}

Bendsøe, M. P. (1995). *Optimization of Structural Topology, Shape, and Material*, Springer-Verlag, Berlin; Heidelberg; London; etc. {*xxiii, 310, 401, 461*}

Bendsøe, M. P., Díaz, A. R., and Kikuchi, N. (1993). Topology and generalized layout optimization of elastic structures, *Topology design of structures (Sesimbra, 1992)*, Kluwer Academic Publishers Group, Dordrecht, pp. 159–205. {*189, 395, 466*}

Bendsøe, M. P., Díaz, A. R., Lipton, R., and Taylor, J. E. (1995). Optimal design of material properties and material distribution for multiple loading conditions, *International Journal for Numerical Methods in Engineering* **38**(7): 1149–1170. {*479*}

Bendsøe, M. P., Díaz, A. R., Lipton, R., and Taylor, J. E. (1996). Parametrization in laminate design for optimal compliance, *International Journal of Solids and Structures* **34**: 415–434. {*500*}

Bendsøe, M. P., Guedes, J. M., Haber, R. B., Pedersen, P., and Taylor, J. E. (1994). An analytical model to predict optimal material properties in the context of optimal structural design, *Journal of Applied Mechanics* **61**(4): 930–937. {*461, 466*}

Bendsøe, M. P., Guedes, J. M., Plaxton, S., and Taylor, J. E. (1996). Optimization of structure and material properties for solids composed of softening material, *International Journal of Solids and Structures* **33**(12): 1799–1813. {*479*}

Bendsøe, M. P., Hammer, V. B., Lipton, R., and Pedersen, P. (1995). Minimum compliance design of laminated plates, *Homogenization and applications to material sciences (Nice, 1995)*, Gakkōtosho, Tokyo, pp. 45–56. see also (Bendsøe, Díaz, Lipton, and Taylor, 1996). {*395, 450, 479*}

Bendsøe, M. P., and Kikuchi, N. (1988). Generating optimal topologies in structural design using a homogenization method, *Computer Methods in Applied Mechanics and Engineering* **71**(2): 197–224. {*121, 395*}

Bendsøe, M. P., and Lipton, R. (1997). Extremal overall elastic response of polycrystalline materials, *Journal of the Mechanics and Physics of Solids* **45**(11-12): 1765–1780. {*450*}

Bendsøe, M. P., and Mota Soares, C. A. (eds) (1992). *Topology Design of Structures*, Vol. 227 of *NATO ASI series. Series E, Applied sciences*, Kluwer Academic Publishers Group, Dordrecht. Boston. London. {*xxiii, 450*}

Bensoussan, A., Boccardo, L., and Murat, F. (1992). *H* convergence for quasilinear elliptic equations with quadratic growth, *Applied Mathematics and Optimization* **26**(3): 253–272. {*64*}

Bensoussan, A., Lions, J. L., and Papanicolaou, G. (1978). *Asymptotic analysis of periodic structures*, North-Holland Publ. {*xxiii, xxv, 45, 48, 49, 60, 64*}

Benveniste, Y. (1994). Exact connections between polycrystal and crystal properties in two-dimensional polycrystalline aggregates, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* **447**: 1–22. {*72*}

Benveniste, Y. (1995). Correspondence relations among equivalent classes of heterogeneous piezoelectric solids under anti-plane mechanical and in-plane electrical fields, *Journal of the Mechanics and Physics of Solids* **43**(4): 553–571. {*72*}

Berdichevsky, V. (1983). *Variational principles of continuum mechanics*, Nauka, Moscow, Russia. In Russian. {*63*}

Berdichevsky, V. (1997). *Thermodynamics of chaos and order*, Longman, Harlow. {*47*}

Berdichevsky, V., Jikov, V., and Papanicolaou, G. (eds) (1999). *Homogenization*, World Scientific Publishing Co., Singapore; Philadelphia; River Edge, NJ. {*47, 63*}

Berdichevsky, V., Kunin, I., and Hussain, F. (1991). Negative temperature of vortex motion, *Physical Review A (Atomic, Molecular, and Optical Physics)* **43**(4): 2050–2051. {*47*}

Bergman, D. J. (1978). The dielectric constant of a composite material—a problem in classical physics, *Physics Reports* **43**(9): 377–407. {*296, 343*}

Bergman, D. J. (1980). Exactly solvable microscopic geometries and rigorous bounds for the complex dielectric constant of a two-component composite material, *Physical Review Letters* **44**: 1285–1287. {*343*}

Bergman, D. J. (1991). Effective medium approximation for nonlinear conductivity of a composite medium, *Composite media and homogenization theory (Trieste, 1990)*, Birkhäuser Boston, Boston, MA, pp. 67–79. {*63*}

Berlyand, L., and Golden, K. (1994). Exact result for the effective conductivity of a continuum percolation model, *Physical Review B (Solid State)* **50**: 2114–2117. {*47*}

Bhattacharya, K., Firoozye, N. B., James, R. D., and Kohn, R. V. (1994). Restrictions on microstructure, *Proceedings of the Royal Society of Edinburgh. Section A, Mathematical and Physical Sciences* **124**(5): 843–878. {*176, 321, 323*}

Bhattacharya, K., and Kohn, R. V. (1997). Elastic energy minimization and the recoverable strains of polycrystalline shape-memory materials, *Archive for Rational Mechanics and Analysis* **139**: 99–180. {*321*}

Bliss, G. A. (1946). *Lectures on the Calculus of Variations*, University of Chicago Press, Chicago, IL. {*10*}

Bourgeat, A., Kozlov, S. M., and Mikelić, A. (1995). Effective equations of two-phase flow in random media, *Calculus of Variations and Partial Differential Equations* **3**(3): 385–406. {*47, 63*}

Bratus′, A. S. (1986). Multiple eigenvalues in problems of optimization of spectral properties of systems with a finite number of degrees of freedom, *Zhurnal Vychislitel'noi Matematiki i Matematicheskoi Fiziki* **26**(5): 645–654, 797. {*479*}

Bratus′, A. S., and Seyranian, A. P. (1983). Bimodal solutions in eigenvalue optimization problems, *Prikladnaia Matematika i Mekhanika (PMM)= Applied Mathematics and Mechanics* **47**: 451–457. {*479*}

Bruggemann, D. A. G. (1930). *Elastizitätskonstanten von Kristallaggregaten*, PhD thesis, Universiteit te Verdedigen, Den Haag. {*183*}

Bruggemann, D. A. G. (1935). Berechnung verschiedener physikalischer Konstanten von heterogenen Substanzen. I. Dielectrizitátkonstanten und Leitfähigkeiten der Mischkörper aus isotropen Substanzen, *Annalen der Physik (1900)* **22**: 636–679. {*xxiii, 55, 183*}

Bruggemann, D. A. G. (1937). Berechnung verschiedener physikalischer Konstanten von heterogenen Substanzen. III. Die elastische Konstanten der Quasi-isotropen Mischkörper aus isotropen Substanzen, *Annalen der Physik (1900)* **29**: 160–178. {*55*}

Bruno, O. P. (1991). The effective conductivity of strongly heterogeneous composites, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* **433**(1888): 353–381. {*72, 306*}

Burns, T., and Cherkaev, A. V. (1997). Optimal distribution of multimaterial composites for torsional beams, *Structural Optimization* **13**(1): 14–23. {*81, 111, 115, 334*}

Buttazzo, G. (1989). *Semicontinuity, relaxation and integral representation in the calculus of variations*, Longman Scientific and Technical, Harlow, Essex, UK. {*145*}

Carathéodory, C. (1967). *Calculus of variations and partial differential equations of the first order. Part II: Calculus of variations*, Holden-Day Inc., San Francisco, Calif. Translated from the German by Robert B. Dean, Julius J. Brandstatter, translating editor. {*16*}

Carothers, S. D. (1912). Plane strain in a wedge, *Proceedings of the Royal Society of Edinburgh* **23**: 292. {*417*}

Cherepanov, G. P. (1974). Inverse problems of the plane theory of elasticity, *Journal of Applied Mathematics and Mechanics* **38**(6): 963–979. {*412, 414*}

Cherkaev, A. V. (1993). Stability of optimal structures of elastic composites, *Topology design of structures (Sesimbra, 1992),*, Vol. 227 of *NATO Adv. Sci. Inst. Ser. E Appl. Sci.*, Kluwer Academic Publishers Group, Dordrecht, pp. 547–558. {*463, 472*}

Cherkaev, A. V. (1994). Relaxation of problems of optimal structural design, *International Journal of Solids and Structures* **31**(16): 2251–2280. {*123, 202, 474, 477*}

Cherkaev, A. V. (1998). Variational approach to structural optimization, in C. T. Leondes (ed.), *Structural Dynamical Systems: Computational Technologies and Optimization*, Gordon and Breach Science Publ., pp. 199–237. {*474*}

Cherkaev, A. V. (1999). Necessary conditions technique in structural optimization, *International Journal of Solids and Structures* . To appear. {*239, 309, 320*}

Cherkaev, A. V., and Gibiansky, L. V. (1988). Optimal design of nonlinear-elastic and elastic-plastic torsioned bars, *Mechanics of Solids* **5**: 168–174. {*92, 103*}

Cherkaev, A. V., and Gibiansky, L. V. (1992). The exact coupled bounds for effective tensors of electrical and magnetic properties of two-component two-dimensional composites, *Proceedings of the Royal Society of Edinburgh. Section A, Mathematical and Physical Sciences* **122**(1-2): 93–125. First version (Gibiansky and Cherkaev, 1988) (in Russian). {*72, 193, 194, 198, 199, 267, 296, 299, 301, 305, 507*}

Cherkaev, A. V., and Gibiansky, L. V. (1993). Coupled estimates for the bulk and shear moduli of a two-dimensional isotropic elastic composite, *Journal of the Mechanics and Physics of Solids* **41**(5): 937–980. {*296, 424, 427, 430, 438, 449*}

Cherkaev, A. V., and Gibiansky, L. V. (1994). Variational principles for complex conductivity, viscoelasticity, and similar problems in media with complex moduli, *Journal of Mathematical Physics* **35**(1): 127–145. {*344, 353*}

Cherkaev, A. V., and Gibiansky, L. V. (1996). Extremal structures of multiphase heat conducting composites, *International Journal of Solids and Structures* **33**(18): 2609–2618. {*311, 315, 342*}

Cherkaev, A. V., Grabovsky, Y., Movchan, A. B., and Serkov, S. K. (1998). The cavity of the optimal shape under the shear stresses, *International Journal of Solids and Structures* **35**(33): 4391–4410. {*242, 412, 417, 418*}

Cherkaev, A. V., Krog, L., and Kucuk, I. (1998). Stable optimal design of two-component elastic structures, *Control and Cybernetics* **27**(2): 265–282. {*467, 472, 474*}

Cherkaev, A. V., Lurie, K. A., and Milton, G. W. (1992). Invariant properties of the stress in plane elasticity and equivalence classes of composites, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* **438**(1904): 519–529. {*220, 372*}

Cherkaev, A. V., and Miettinen, M. (1999). Necessary condition in the polycrystal *G*-closure problem. in preparation. {*341, 342*}

Cherkaev, A. V., and Palais, R. (1997). Optimal design of three-dimensional axisymmetric structures, *Structural Optimization* **13**(1): 10–23. {*386, 405*}

Cherkaev, A. V., and Palais, R. (1998). Optimal design of three-dimensional axisymmetric elastic structures, in C. T. Leondes (ed.), *Structural Dynamical Systems: Computational Technologies and Optimization*, Gordon and Breach Science Publ., pp. 237–267. {*405, 461*}

Cherkaev, A. V., and Robbins, T. C. (1999). Optimization of heat conducting structures, *Proceedings of the 3rd World Congress of Structural and Multidisciplinary Optimization*, ISSMO, Buffalo, New York, p. 89. {*138*}

Cherkaev, A. V., and Slepyan, L. (1995). Waiting element structures and stability under extension, *International Journal of Damage Mechanics* **4**: 58–82. {*47*}

Cherkaeva, E. (1997). Optimal source control and resolution in nondestructive testing, *Structural Optimization* **13**(1): 12–16. {*484*}

Cherkaeva, E., and Cherkaev, A. V. (1995). Bounds for detectability of material damage by noisy electrical measurements, *Structural and multidisciplinary optimization*, Pergamon, New York, pp. 543–548. {*244, 479, 487*}

Cherkaeva, E., and Cherkaev, A. V. (1998). Optimal design for uncertain loading conditions, *Homogenization*, World Scientific Publishing Co., Singapore; Philadelphia; River Edge, NJ, p. in print. {*479*}

Cherkaeva, E., and Cherkaev, A. V. (1999). Structural optimization and biological "designs", in P. Pedersen, and M. Bendsøe (eds), *Synthesis in bio solid mechanics*, Solid mechanics and its applications, Kluwer Academic Publishers Group, Dordrecht. Boston. London, pp. 247–264. {*479*}

Cherkaeva, E., and Tripp, A. C. (1996). Inverse conductivity problem for inaccurate measurements, *Inverse Problems* **12**(6): 869–883. {*484*}

Chiheb, R., and Panasenko, G. P. (1998). Optimization of finite rod structures and L-convergence, *Journal of Dynamical and Control Systems* **4**(2): 273–304. {*64, 466*}

Christensen, R. M. (1971). *Theory of Viscoelasticity*, Academic Press, New York. {*353*}

Christensen, R. M. (1979). *Mechanics of Composite Materials*, Wiley-Interscience, New York. {*47, 55, 63, 425*}

Cioranescu, D., and Murat, F. (1982). Un terme étrange venu d'ailleurs. II, pp. 154–178, 425–426. Translated to English in (Cioranescu and Murat, 1997). {*47, 504*}

Cioranescu, D., and Murat, F. (1997). A strange term coming from nowhere, **31**: 45–93. Translation of the paper (Cioranescu and Murat, 1982). {*504*}

Clark, K. E., and Milton, G. W. (1994). Modelling the effective conductivity function of an arbitrary two-dimensional polycrystal using sequential laminates, *Proceedings of the Royal Society of Edinburgh. Section A, Mathematical and Physical Sciences* **124**(4): 757–783. {*293*}

Clark, K. E., and Milton, G. W. (1995). Optimal bounds correlating electric, magnetic and thermal properties of two-phase, two-dimensional composites, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* **448**(1933): 161–190. {*296*}

Clements, D. J., and Anderson, B. D. O. (1978). *Singular optimal control: the linear-quadratic problem*, Springer-Verlag, Berlin. Lecture Notes in Control and Information Sciences, Vol. 5. {*24*}

Courant, R., and Hilbert, D. (1962). *Methods of Mathematical Physics*, Interscience Publishers, New York. {*10, 36, 43, 105, 413*}

Cox, S. J., and Overton, M. L. (1992). On the optimal design of columns against buckling, *SIAM Journal on Mathematical Analysis* **23**(2): 287–325. {*479, 487*}

Dacorogna, B. (1982). *Weak continuity and weak lower semicontinuity of nonlinear functionals*, Springer-Verlag, Berlin. {*118, 120, 150, 158, 162, 221, 474*}

Dacorogna, B. (1989). *Direct methods in the calculus of variations*, Springer-Verlag, Berlin; Heidelberg; London; etc. {*10, 14, 145*}

Dacorogna, B., and Haeberly, J.-P. (1996). Remarks on a numerical study of convexity, quasiconvexity, and rank one convexity, *Variational methods for discontinuous structures (Como, 1994)*, Birkhäuser, Basel, pp. 143–154. {*155*}

Dal Maso, G. (1993). *An introduction to Γ-convergence*, Birkhäuser Boston Inc., Cambridge, MA. {*64, 118*}

Dal Maso, G., and Dell'Antonio, G. (eds) (1991). *Composite media and homogenization theory*, Birkhäuser Boston Inc., Cambridge, MA. {*47*}

De Giorgi, E. (1994a). New ideas in calculus of variations and geometric measure theory, *Motion by mean curvature and related topics (Trento, 1992)*, Walter de Gruyter, New York, USA and Berlin, Germany, pp. 63–69. {*xxiii*}

De Giorgi, E. (1994b). On the convergence of solutions of some evolution differential equations, *Set-Valued Analysis* **2**(1-2): 175–182. Set convergence in nonlinear analysis and optimization. {*xxiii*}

Dem′yanov, V. F., and Malozëmov, V. N. (1990). *Introduction to minimax*, Dover Publications, Inc., New York. Translated from the Russian by D. Louvish, Reprint of the 1974 edition. {*103, 489*}

Díaz, A. R., and Bendsøe, M. P. (1992). Shape optimization of structures for multiple loading situations using a homogenization method, *Structural Optimization* **4**: 17–22. {*479*}

Díaz, A. R., Kikuchi, N., Papalambros, P. Y., and Taylor, J. E. (1993). Design of an optimal grid for finite element methods, *Journal of Structural Mechanics* **11**(2): 215–230. {*395, 461*}

Díaz, A. R., and Lipton, R. (1997). Optimal material layout for 3D elastic structures, *Structural Optimization* **13**: 60–64. Preliminary version in (Lipton and Díaz, 1995). {*395, 405, 513*}

Díaz, A. R., Lipton, R., and Soto, C. A. (1994). A new formulation of the problem of optimum reinforcement of Reissner-Mindlin plates, *Computer Methods in Applied Mechanics and Engineering* . {*189*}

Díaz, A. R., and Sigmund, O. (1995). Checkerboard patterns in layout optimization, *Structural Optimization* **10**: 40–45. {*466*}

Ding, Y. (1986). Shape optimization of structures: A literature survey, *Computers and Structures* **24**(6): 985–1004. {*466*}

Dolzmann, G., and Müller, S. (1995). The influence of surface energy on stress-free microstructures in shape memory alloys, *Meccanica (Milan)* **30**(5): 527–539. Microstructure and phase transitions in solids (Udine, 1994). {*145*}

Dundurs, J. (1989). Cavities vis-à-vis rigid inclusions and some related general results in plane elasticity, *Journal of Applied Mechanics* **56**(4): 786–790. {*372*}

Dundurs, J., and Jasiuk, I. (1997). Effective elastic moduli of composite materials: Reduced parameters dependence, *Applied Mechanics Reviews* **50**: S39–S43. {*372*}

Dvořák, J. (1994). A reliable numerical method for computing homogenized coefficients, *Technical Report MAT-Report 31*, Mathematical Institute, Danish Technical University, Lyngby, Denmark. {*81*}

Dykhne, A. M. (1970). Conductivity of a two-dimensional two-phase system, *Journal of Experimental and Theoretical Physics (JETP)* **7**: 110–116. {*304*}

Dykhne, A. M. (1971). Conductivity of a two-dimensional two-phase system, *Journal of Experimental and Theoretical Physics (JETP)* **32**: 63–65. {*292, 304*}

Ekeland, I., and Temam, R. (1976). *Convex analysis and variational problems*, North-Holland Publishing Co., Amsterdam, The Netherlands. Translated from the French, Studies in Mathematics and its Applications, Vol. 1. {*8, 29, 30, 44, 45, 145, 155*}

Eshelby, J. D. (1957). The determination of the elastic field of an ellipsoidal inclusion, and related problems, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* **241**: 376–396. {*242*}

Eshelby, J. D. (1961). Elastic inclusions and inhomogeneities, *Progress in Solid Mechanics, Vol. II*, North-Holland Publishing Co., Amsterdam, The Netherlands, pp. 87–140. {*242*}

Eshelby, J. D. (1975). The elastic energy-momentum tensor, *Journal of Elasticity* **5**(3-4): 321–335. Special issue dedicated to A. E. Green. {*242*}

Ewing, G. M. (1969). *Calculus of variations with applications*, W. W. Norton & Co. Inc., New York. {*xxv*}

Fannjiang, A., and Papanicolaou, G. (1994). Convection enhanced diffusion for periodic flows, *SIAM Journal on Applied Mathematics* **54**(2): 333–408. {*344*}

Fedorov, A. V., and Cherkaev, A. V. (1983). Choosing of optimal orientation of axes of elastic symmetry of orthotropic plate, *Mechanics of Solids* **3**: 135–142. {*449, 450*}

Fenchel, W. (1949). On conjugate convex functions, *Canadian Journal of Mathematics* **1**: 73–77. {*29, 30*}

Firoozye, N. B. (1991). Optimal use of the translation method and relaxations of variational problems, *Communications on Pure and Applied Mathematics (New York)* **44**(6): 643–678. {*214*}

Firoozye, N. B., and Kohn, R. V. (1993). Geometric parameters and the relaxation of multiwell energies, in D. Kinderlehrer, R. James, M. Luskin, and J. L. Ericksen (eds), *Microstructure and phase transition*, Springer-Verlag, New York, pp. 85–109. {*309*}

Fonseca, I. (1987). Variational methods for elastic crystals, *Archive for Rational Mechanics and Analysis* **97**(3): 189–220. {*450*}

Fonseca, I. (1989). Phase transitions of elastic solid materials, *Archive for Rational Mechanics and Analysis* **107**(3): 195–223. {*xxiii, 321*}

Fonseca, I. (1992). Lower semicontinuity of surface energies, *Proceedings of the Royal Society of Edinburgh. Section A, Mathematical and Physical Sciences* **120**(1-2): 99–115. {*145*}

Fonseca, I., Kinderlehrer, D., and Pedregal, P. (1994). Energy functionals depending on elastic strain and chemical composition, *Calculus of Variations and Partial Differential Equations* **2**(3): 283–313. {*xxiii*}

Fox, C. (1987). *An introduction to the calculus of variations*, Dover Publications, Inc., New York. Reprint of the 1963 edition. {*10, 42*}

Francfort, G. A., and Milton, G. W. (1987). Optimal bounds for conduction in two-dimensional, multiphase, polycrystalline media, *Journal of Statistical Physics* **46**(1-2): 161–177. {*274, 277*}

Francfort, G. A., and Murat, F. (1986). Homogenization and optimal bounds in linear elasticity, *Archive for Rational Mechanics and Analysis* **94**(4): 307–334. {*185, 189, 191, 382, 385, 387, 493*}

Francfort, G. A., Murat, F., and Tartar, L. (1995). Fourth-order moments of nonnegative measures on $S^2$ and applications, *Archive for Rational Mechanics and Analysis* **131**(4): 305–333. {*387, 467*}

Francfort, G. A., and Tartar, L. (1991). Comportement effectif d'un mélange de matériaux élastiques isotropes ayant le mˆeme module de cisaillement, *Comptes Rendus de l'Académie des Sciences, Paris* **312**(3): 301–307. {*422*}

Fu, Y., Klimkowski, K. J., Rodin, G. J., Berger, E., Browne, J. C., Singer, J. K., van de Geijn, R. A., and Vemaganti, K. S. (1998). A fast solution method for three-dimensional many-particle problems of linear elasticity, *International Journal for Numerical Methods in Engineering* **42**: 1215–1229. {*47*}

Fuchs, M. B., and Hakim, S. (1996). Improved multivariate reanalysis of structures based on the structural variation method, *Mechanics of Structures and Machines* **24**(1): 51–70. {*479*}

Gabasov, R., and Kirillova, F. M. (1973). *Singular optimal controls*, Nauka, Moscow, Russia. Monographs in Theoretical Foundations of Technical Cybernetics. {*24*}

Gamkrelidze, R. V. (1962). On sliding optimal states, *Doklady Akademii Nauk SSSR* **143**: 1243–1245. {*7, 14, 24*}

Gamkrelidze, R. V. (1985). Sliding modes in optimal control theory, *Trudy Matematicheskogo Instituta imeni V. A. Steklova = Proceedings of the Steklov Institute of Mathematics* **169**: 180–193, 255. Topology, ordinary differential equations, dynamical systems. {*14*}

Gelfand, I. M., and Fomin, S. V. (1963). *Calculus of variations*, Prentice-Hall, Upper Saddle River, NJ 07458. Revised English edition translated and edited by Richard A. Silverman. {*xxv, 10, 29, 124, 222, 349, 351, 352*}

Gibiansky, L. V., and Cherkaev, A. V. (1984). Design of composite plates of extremal rigidity, *Report 914*, Ioffe Physico-technical Institute, Acad of Sc, USSR, Leningrad, USSR. English translation in (Gibiansky and Cherkaev, 1997a). {*81, 214, 382, 395, 397, 399, 407–409, 507*}

Gibiansky, L. V., and Cherkaev, A. V. (1987). Microstructures of composites of extremal rigidity and exact estimates of the associated energy density, *Report 1115*, Ioffe Physico-Technical Institute, Acad of Sc, USSR, Leningrad, USSR. English translation in (Gibiansky and Cherkaev, 1997b). {*185, 191, 214, 228, 382, 385, 386, 389, 395, 405, 412, 458, 508*}

Gibiansky, L. V., and Cherkaev, A. V. (1988). The set of tensor pairs of dielectric and magnetic permeabilities of two-phase composites, *Technical Report 1286*, Ioffe Physico-technical Institute, Acad of Sc, USSR, Leningrad, USSR. English translation in (Cherkaev and Gibiansky, 1992). {*502*}

Gibiansky, L. V., and Cherkaev, A. V. (1997a). Design of composite plates of extremal rigidity, in A. V. Cherkaev, and R. V. Kohn (eds), *Topics in the mathematical modelling of composite materials*, Vol. 31 of *Progress in nonlinear differential equations and their applications*, Birkhäuser Boston, Boston, MA, pp. 95–137. Translation. The original publication in (Gibiansky and Cherkaev, 1984). {*507*}

Gibiansky, L. V., and Cherkaev, A. V. (1997b). Microstructures of composites of extremal rigidity and exact bounds on the associated energy density, in A. V. Cherkaev, and R. V. Kohn (eds), *Topics in the mathematical modelling of composite materials*, Vol. 31 of *Progress in nonlinear differential equations*

*and their applications*, Birkhäuser Boston, Boston, MA, pp. 273–317. Translation. The original publication is in (Gibiansky and Cherkaev, 1987). {*507*}

Gibiansky, L. V., Lurie, K. A., and Cherkaev, A. V. (1988). Optimal focusing of heat flow by heterogeneous heat conducting media (thermolens problem), *Zhurnal Tehniceskoj Fiziki* **58**(1): 67–74. {*130, 135*}

Gibiansky, L. V., and Milton, G. W. (1993). On the effective viscoelastic moduli of two-phase media: I. Rigorous bounds on the complex bulk modulus, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* **440**(1908): 163–188. {*344, 353, 355*}

Gibiansky, L. V., and Sigmund, O. (1998). Multiphase composites with extremal bulk modulus, *Technical Report 600*, DCAMM, DTU, Lyngby, Denmark. {*309, 339, 342*}

Gibiansky, L. V., and Torquato, S. (1993). Link between the conductivity and elastic moduli of composite materials, *Physical Review Letters* **71**(18): 2927–2930. {*296, 355, 438*}

Gibiansky, L. V., and Torquato, S. (1995a). Geometrical-parameter bounds on the effective moduli of composites, *Journal of the Mechanics and Physics of Solids* **43**(10): 1587–1613. {*438*}

Gibiansky, L. V., and Torquato, S. (1995b). Rigorous link between the conductivity and elastic moduli of fiber-reinforced composite materials, *Philosophical Transactions of the Royal Society of London Series A* **353**: 243–278. {*296, 355, 438*}

Gibiansky, L. V., and Torquato, S. (1996a). Bounds on the effective moduli of cracked materials, *Journal of the Mechanics and Physics of Solids* **44**(2): 233–242. {*355, 438*}

Gibiansky, L. V., and Torquato, S. (1996b). Connection between the conductivity and bulk modulus of isotropic composite materials, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* **452**(1945): 253–283. {*355*}

Golden, K. (1986). Bounds on the complex permittivity of a multicomponent material, *Journal of the Mechanics and Physics of Solids* **34**(4): 333–358. {*309, 343*}

Golden, K., and Papanicolaou, G. (1983). Bounds for effective parameters of heterogeneous media by analytic continuation, *Communications in Mathematical Physics* **90**(4): 473–491. {*343*}

Golden, K., and Papanicolaou, G. (1985). Bounds for effective parameters of multicomponent media by analytic continuation, *Journal of Statistical Physics* **40**(5-6): 655–667. {*309, 343*}

Goodman, J., Kohn, R. V., and Reyna, L. (1986). Numerical study of a relaxed variational problem from optimal design, *Computer Methods in Applied Mechanics and Engineering* **57**: 107–127. {*81, 90, 110*}

Grabovsky, Y. (1993). The G-closure of two well-ordered anisotropic conductors, *Proceedings of the Royal Society of Edinburgh* **123A**: 423–432. {*282*}

Grabovsky, Y. (1996). Bounds and extremal microstructures for two-component composites: A unified treatment based on the translation method, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* **452**(1947): 945–952. {*395*}

Grabovsky, Y. (1998). Exact relations for effective tensors of polycrystals. I. necessary conditions, *Archive for Rational Mechanics and Analysis* **143**(4): 309–329. {*72*}

Grabovsky, Y., and Kohn, R. V. (1995a). Microstructures minimizing the energy of a two phase elastic composite in two space dimensions. I: the confocal ellipse construction, *Journal of the Mechanics and Physics of Solids* **43**(6): 933–947. {*412, 414*}

Grabovsky, Y., and Kohn, R. V. (1995b). Microstructures minimizing the energy of a two phase elastic composite in two space dimensions. II: the Vigdergauz microstructure, *Journal of the Mechanics and Physics of Solids* **43**(6): 949–972. {*412, 414*}

Grabovsky, Y., and Milton, G. W. (1998). Exact relations for composites: towards a complete solution, *Proceedings of the International Congress of Mathematicians, (Berlin, 1998)*, Vol. III, pp. 623–632 (electronic). {*72, 272, 305*}

Grabovsky, Y., Milton, G. W., and Sage, D. S. (1999). Exact relations for effective tensors of polycrystals: Necessary conditions and sufficient conditions, *in preparation* . {*293*}

Grabovsky, Y., and Sage, D. S. (1998). Exact relations for effective tensors of polycrystals. II. Applications to elasticity and piezoelectricity, *Archive for Rational Mechanics and Analysis* **143**(4): 331–356. {*72*}

Greengard, L., and Helsing, J. (1998). On the numerical evaluation of elastostatic fields in locally isotropic two-dimensional composites, *Journal of the Mechanics and Physics of Solids* **46**(8): 1441–1462. {*47*}

Greengard, L., and Rokhlin, V. (1997). A new version of the fast multipole method for the laplace equation in three dimensions, *Acta numerica, 1997*, Cambridge University Press, Cambridge, UK, pp. 229–269. {*47*}

Guedes, J. M., and Taylor, J. E. (1996). On the prediction of material properties and topology for optimal continuum structures, *Structural Optimization* **14**: 193–199. {*466*}

Gurtin, M. E. (1972). The linear theory of elasticity, *Handbuch der Physik*, Vol. 6a/2, Springer-Verlag, New York, pp. 1–295. {*359*}

Haber, R. B., Jog, C., and Bendsøe, M. P. (1994). Variable-topology shape optimization with a constraint on perimeter, in B. Gilmore et al. (eds), *Advances in Design Automation*, Vol. DE 69-2, ASME, New York, pp. 261–272. {*466*}

Haber, R. B., Jog, C., and Bendsøe, M. P. (1996). A new approach to variable-topology shape design using a constraint on perimeter, *Structural Optimization* **11**: 1–12. {*395, 466*}

Haftka, R. T., and Gürdal, Z. (1992). *Elements of structural optimization*, third edn, Kluwer Academic Publishers Group, Dordrecht. {*xxiii, 461*}

Hardy, G. H., Littlewood, J. E., and Pólya, G. (1988). *Inequalities*, Cambridge University Press, Cambridge, UK. {*8, 9*}

Hashin, Z. (1965). On elastic behaviour of fibre reinforced materials of arbitrary transverse phase geometry, *Journal of the Mechanics and Physics of Solids* **13**: 119–134. {*426*}

Hashin, Z. (1970a). Theory of composite materials, in F. W. Wendt, U. Liebowitz, and N. Perrone (eds), *Mechanics of composite materials*, Pergamon, New York, pp. 257–282. {*425*}

Hashin, Z. (1970b). Theory of fiber reinforced materials, *Report Contract NAS1-8818*, University of Pennsylvania, Phyladelpia, PA. {*63, 425*}

Hashin, Z. (1983). Analysis of composite materials: a survey, *Journal of Applied Mechanics* **50**: 481–505. {*63*}

Hashin, Z. (1992). Extremum principles for elastic heterogenous media with imperfect interfaces and their application to bounding of effective moduli, *Journal of the Mechanics and Physics of Solids* **40**(4): 767–781. {*63*}

Hashin, Z., and Shtrikman, S. (1962a). A variational approach to the theory of the effective magnetic permeability of multiphase materials, *Journal of Applied Physics* **35**: 3125–3131. {*xxiii, 55, 57, 67, 192, 253, 255, 280, 283*}

Hashin, Z., and Shtrikman, S. (1962b). A variational approach to the theory of the elastic behavior of polycrystals, *Journal of the Mechanics and Physics of Solids* **10**: 343–352. {*xxiii, 384, 387*}

Hashin, Z., and Shtrikman, S. (1963). A variational approach to the theory of the elastic behavior of multiphase materials, *Journal of the Mechanics and Physics of Solids* **11**: 127–140. {*309, 425, 493*}

Haslinger, J., and Dvořák, J. (1995). Optimum composite material design, *Mathematical Modelling and Numerical Analysis = Modelisation Mathématique et Analyse Numérique: $M^2AN$* . {*81*}

Haug, E. J., Choi, K. K., and Komkov, V. (1986). *Design Sensitivity Analysis of Structural System*, Mathematics in Science and Engineering. Volume 177, Academic Press, New York. {*461*}

Helsing, J., Milton, G. W., and Movchan, A. B. (1997). Duality relations, correspondences and numerical results for planar elastic composites, *Journal of the Mechanics and Physics of Solids* **45**(4): 565–590. {*47, 371*}

Hill, R. (1963). Elastic properties of reinforced solids: Some theoretical principles, *Journal of the Mechanics and Physics of Solids* **11**: 357–372. {*xxiii, 380*}

Hill, R. (1964). Theory of mechanical properties of fibre-strengthened materials. I. Elastic behaviour, *Journal of the Mechanics and Physics of Solids* **12**: 199–212. {*xxiii, 421–423*}

Hornung, U. (ed.) (1997). *Homogenization and porous media*, Springer-Verlag, New York. {*47*}

Ioffe, A. D., and Tihomirov, V. M. (1979). *Theory of extremal problems*, North-Holland Publishing Co., Amsterdam, The Netherlands. Translated from the Russian by Karol Makowski. {*7, 13, 23, 29*}

Jäger , W., Oleĭnik, O. A., and Schamajev, A. S. (1993). Averaging problem for Laplace equation in a partially perforated domain (in Russian), *Technical Report 333/4*, Dokladi Akademii Nauk (DAN) (Papers of the Academy of Sciences). {*xxiii*}

Jikov, V. V., Kozlov, S. M., and Oleĭnik, O. A. (1994). *Homogenization of differential operators and integral functionals*, Springer-Verlag, Berlin. Translated from the Russian by G. A. Yosifian [G. A. Iosif′yan]. {*xxiii, xxv, 45, 49, 50, 60, 64, 118, 292*}

Jog, C., and Haber, R. B. (1996). Stability of finite element models for distributed-parameter optimization and topology design, *Journal for Computational Methods in Applied Mechanics and Engineering* **130**(8): 203–226. {*466*}

Jog, C., Haber, R. B., and Bendsøe, M. P. (1993). A displacement-based topology design method with self-adaptive layered materials, in M. P. Bendsøe, and C. A. Mota Soares (eds), *Topology Design of Structures, Sesimbra, Portugal*, NATO ASI, Kluwer Academic Publishers Group, Dordrecht. Boston. London, pp. 219–243. {*466*}

Jog, C., Haber, R. B., and Bendsøe, M. P. (1994). Topology design with optimized self-adaptive materials, *International Journal for Numerical Methods in Engineering* **37**(8): 1323–1350. {*461*}

Kaganova, I., and Roitburd, A. (1987). Equilibrium shape of an inclusion in a solid, *Soviet Physics—Doklady* **32**: 925–927. {*xxiii*}

Karp, S. N., and Karal, F. C. (1962). The elastic-field behaviour in the neighbourhood of a crack of arbitrary angle, *Communications on Pure and Applied Mathematics (New York)* **15**: 413–421. {*417*}

Keller, J. B. (1964). A theorem on the conductivity of a composite medium, *Journal of Mathematical Physics* **5**: 548–549. {*xxiii, 292, 304*}

Khachaturyan, A. G. (1983). *Theory of structural transformation in solids*, John Wiley and Sons, New York; London; Sydney. {*xxiii, 321*}

Khruslov, E. Y. (1991). Homogenized models of composite media, *Composite media and homogenization theory (Trieste, 1990)*, Birkhäuser Boston Inc., Cambridge, MA, pp. 159–182. {*47*}

Khruslov, E. Y. (1995). Homogenized models of strongly inhomogeneous media, *Proceedings of the International Congress of Mathematicians, Vol. 1, 2 (Zürich, 1994)*, Birkhäuser Verlag, Basel, Switzerland, pp. 1270–1278. {*63*}

Kinderlehrer, D., James, R., Luskin, M., and Ericksen, J. L. (eds) (1993). *Microstructure and phase transition*, Springer-Verlag, New York. {*321*}

Kinderlehrer, D., and Pedregal, P. (1991). Characterizations of Young measures generated by gradients, *Archive for Rational Mechanics and Analysis* **115**(4): 329–365. {*164*}

Kinderlehrer, D., and Pedregal, P. (1994). Gradient Young measures generated by sequences in Sobolev spaces, *Journal of Geometric Analysis* **4**(1): 59–90. {*164*}

Klosowicz, B., and Lurie, K. A. (1971). On the optimal nonhomogeneity of a torsional elastic bar, *Archives of Mechanics = Archiwum Mechaniki Stosowanej* **24**(2): 239–249. {*97, 110*}

Kloušek, P., and Luskin, M. (1994). Computational modeling of the martensitic transformation with surface energy, *Mathematical and Computer Modelling* **20**(10-11): 101–121. {*145*}

Kohn, R. V. (1991). The relaxation of a double-well energy, *Continuum Mechanics and Thermodynamics* **3**: 193–236. {*158*}

Kohn, R. V., and Lipton, R. (1988). Optimal bounds for the effective energy of a mixture of isotropic, incompressible, elastic materials, *Archive for Rational Mechanics and Analysis* **102**(4): 331–350. {*189, 395, 425*}

Kohn, R. V., and Milton, G. W. (1986). On bounding the effective conductivity of anisotropic composites, in J. Ericksen et al. (eds), *Homogenization and Effective Moduli of Materials and Media (Minneapolis, Minn., 1984/1985)*, Springer-Verlag, Berlin; Heidelberg; London; etc., pp. 97–125. {*269, 282*}

Kohn, R. V., and Müller, S. (1994). Surface energy and microstructure in coherent phase transitions, *Communications on Pure and Applied Mathematics (New York)* **47**: 405–435. {*145*}

Kohn, R. V., and Strang, G. (1982). Structural design, optimization, homogenization, and relaxation of variational problems, in R. Burridge, G. Papanicolaou, and S. Childress (eds), *Macroscopic Properties of Disordered Media*, Vol. 154 of *Lect. Notes Phys.*, Springer-Verlag, pp. ??–?? {*214, 218*}

Kohn, R. V., and Strang, G. (1983). Explicit relaxation of a variational problem in optimal design, *Bulletin of the American Mathematical Society* **9**: 211–214. {*214, 218*}

Kohn, R. V., and Strang, G. (1986a). Optimal design and relaxation of variational problems, *Communications on Pure and Applied Mathematics (New York)* **39**: 1–25 (part I), 139–182 (part II) and 353–357 (part III). {*81, 85, 90, 121, 155, 158, 165, 166, 214, 218*}

Kohn, R. V., and Strang, G. (1986b). Optimal design in elasticity and plasticity, *International Journal for Numerical Methods in Engineering* **22**(1): 183–188. {*121, 189, 425*}

Kozlov, S. M., and Piatnitski, A. L. (1996). Degeneration of effective diffusion in the presence of periodic potential, *Annales de l'Institut Henri Poincaré. Section B, Probabilités et Statistiques* **32**(5): 571–587. {*47*}

Krasnosel′skiĭ, M. A., and Rutickiĭ, J. B. (1961). *Convex functions and Orlicz spaces*, P. Noordhoff Ltd., Groningen. Translated from the first Russian edition by Leo F. Boron. {*8*}

Krog, L. A., and Olhoff, N. (1995). Topology optimization of plate and shell structures with multiple eigenfrequencies., in N. Olhoff, and G. I. N. Rozvany (eds), *Structural and Multidisciplinary Optimization*, Pergamon, Oxford, UK, 1995, Goslar, Germany, pp. 675–682. {*479*}

Kuttler, J. R. (1982). Bounds for Stekloff eigenvalues, *SIAM Journal on Numerical Analysis* **19**(1): 121–125. {*479*}

Landau, L. D., and Lifshitz, E. M. (1984). *Electrodynamics of continuous media*, Pergamon, New York. {*36, 343, 345, 347*}

Larsen, U. D., Sigmund, O., and Bouwstra, S. (1997). Design and fabrication of compliant mechanisms and material structures with negative Poisson's ratio, *Journal of Microelectromechanical Systems* **6**(2): 99–106. {*390*}

Lavrent'ev, M. A. (1989). *Variational methods for boundary value problems for systems of elliptic equations*, second edn, Dover Publications, Inc., New York. Translated from the Russian by J. R. M. Radok. {*10*}

Lavrov, N., Lurie, K. A., and Cherkaev, A. V. (1980). Non-homogeneous bar of extremal rigidity in torsion (in russian), *Izvestiia Akademii Nauk SSSR. Mekhanika Tverdogo Tela* **6**. {*81, 86, 89, 92, 110*}

Leitmann, G. (1981). *The calculus of variations and optimal control*, Plenum Press, New York; London. An introduction, Posebna Izdanja [Special Editions], 14. {*10*}

Levin, V. M. (1999). The elastic wave propagation in the piezoelectric fiber reinforced composites, in K. Markov, and E. Inan (eds), *Continuum models and discrete systems*, World Scientific Publishing Co. Inc., River Edge, NJ. {*47*}

Lipton, R. (1988). On the effective elasticity of a two-dimensional homogenised incompressible elastic composite, *Proceedings of the Royal Society of Edinburgh. Section A, Mathematical and Physical Sciences* **110**(1-2): 45–61. {*395, 425*}

Lipton, R. (1992). Bounds and perturbation series for incompressible elastic composites with transverse isotropic symmetry, *Journal of Elasticity* **27**(3): 193–225. {*189*}

Lipton, R. (1993). On implementation of partial relaxation for optimal structural compliance problems, in P. Pedersen (ed.), *Optimal Design with Advanced Materials. Lyngby, Denmark*, IUTAM, Elsevier, Amsterdam, The Netherlands, pp. 451–468. {*395*}

Lipton, R. (1994a). On optimal reinforcement of plates and choice of design parameters, *Control and Cybernetics* **23**(3): 481–493. {*385*}

Lipton, R. (1994b). Optimal bounds on effective elastic tensors for orthotropic composites, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* **444**(1921): 399–410. {*395*}

Lipton, R. (1998). The second Stekloff eigenvalue and energy dissipation inequalities for functionals with surface energy, *SIAM Journal on Mathematical Analysis* **29**(3): 673–680 (electronic). {*145*}

Lipton, R., and Díaz, A. R. (1995). Moment formulations for optimum layout in 3D elasticity., in N. Olhoff, and G. I. N. Rozvany (eds), *Structural and Multidisciplinary Optimization, Goslar, Germany*, Pergamon, New York, pp. 161–168. Journal version in (Díaz and Lipton, 1997). {*189, 505*}

Lurie, A. I. (1970a). *Theory of elasticity*, Nauka, Moscow, Russia. In Russian. {*359, 360*}

Lurie, A. I. (1990a). *Nonlinear theory of elasticity*, North-Holland Publishing Co., Amsterdam, The Netherlands. Translated from the Russian by K. A. Lurie. {*359*}

Lurie, K. A. (1963). The Mayer-Bolza problem for multiple integrals and optimization of the behavior of systems with distributed parameters, *Prikladnaia Matematika i Mekhanika (PMM)= Applied Mathematics and Mechanics* **27**(2): 842–853. In Russian. {*92, 123, 240*}

Lurie, K. A. (1967). The Mayer-Bolza problem for multiple integrals: Some optimum problems for elliptic differential equations arriving in magnetohydrodynamics, in G. Leitmann (ed.), *Topics in Optimization*, Academic Press, New York, pp. 147–193. {*92, 118, 123, 240*}

Lurie, K. A. (1970b). On the optimal distribution of the resistivity tensor of the working medium in the channel of a MHD generator, *Prikladnaia Matematika i Mekhanika (PMM)= Applied Mathematics and Mechanics* **34**(2): 67–81. {*122, 240*}

Lurie, K. A. (1975). *Optimal control in problems of mathematical physics*, Nauka, Moscow, Russia. In Russian. {*81, 92, 94, 240*}

Lurie, K. A. (1990b). The extension of optimisation problems containing controls in the coefficients, *Proceedings of the Royal Society of Edinburgh. Section A, Mathematical and Physical Sciences* **114**(1-2): 81–97. {*123, 133, 158*}

Lurie, K. A. (1993). *Applied Optimal Control Theory of Distributed Systems*, Plenum Press, New York; London. {*240*}

Lurie, K. A. (1994). Direct relaxation of optimal layout problems for plates, *Journal of Optimization Theory and Applications* **80**(1): 93–116. {*123, 133, 158*}

Lurie, K. A., and Cherkaev, A. V. (1978). Nonhomogeneous bar of extremal torsional rigidity, *Nonlinear problems in structural mechanics. Structural optimization*, Naukova Dumka, Kiev, Ukraine, pp. 64–68. {*81, 85, 89, 110, 121*}

Lurie, K. A., and Cherkaev, A. V. (1981a). *G*-closure of a set of anisotropic conducting media in the case of two dimensions, *Doklady Akademii Nauk SSSR* **259**(2): 328–331. In Russian. {*67, 272, 274, 292*}

Lurie, K. A., and Cherkaev, A. V. (1981b). *G*-closure of a set of anisotropically conducting media in the two-dimensional case, *Report 213*, DCAMM, Technical University of Denmark. Published later as (Lurie and Cherkaev, 1984c). {*272, 274, 292, 515*}

Lurie, K. A., and Cherkaev, A. V. (1981c). *G*-closure of some particular sets of admissible material characteristics for the problem of bending of thin elastic plates, *Report 214*, DCAMM, Technical University of Denmark. Published later as (Lurie and Cherkaev, 1984d). {*67, 213, 372, 422–424, 449, 451, 515*}

Lurie, K. A., and Cherkaev, A. V. (1982). Exact estimates of conductivity of mixtures composed of two isotropical media taken in prescribed proportion, *Technical Report Ref. 783*, Physical-Technical Institute, Acad. Sci. USSR. In Russian. Published in English as (Lurie and Cherkaev, 1984b). {*189, 192, 213, 280, 515*}

Lurie, K. A., and Cherkaev, A. V. (1984a). Exact estimates of conductivity of a binary mixture of isotropic compounds, *Report 894*, Ioffe Physico-technical Institute, Acad of Sc, USSR. In Russian. Published in English as (Lurie and Cherkaev, 1986b). {*192, 193, 213, 284, 287, 515*}

Lurie, K. A., and Cherkaev, A. V. (1984b). Exact estimates of conductivity of composites formed by two isotropically conducting media taken in prescribed proportion, *Proceedings of the Royal Society of Edinburgh. Section A, Mathematical and Physical Sciences* **99**(1-2): 71–87. Published earlier as (Lurie and Cherkaev, 1982) (in Russian). {*514*}

Lurie, K. A., and Cherkaev, A. V. (1984c). *G*-closure of a set of anisotropically conducting media in the two-dimensional case, *Journal of Optimization Theory and Applications* **42**(2): 283–304. First published as (Lurie and Cherkaev, 1981b). See errata (Lurie and Cherkaev, 1987). {*514, 515*}

Lurie, K. A., and Cherkaev, A. V. (1984d). *G*-closure of some particular sets of admissible material characteristics for the problem of bending of thin elastic plates, *Journal of Optimization Theory and Applications* **42**(2): 305–316. Published first as (Lurie and Cherkaev, 1981c). See errata (Lurie and Cherkaev, 1987). {*514, 515*}

Lurie, K. A., and Cherkaev, A. V. (1984e). G-closure of some particular sets of admissible material characteristics for the problem of bending of thin plates, *Journal of Optimization Theory and Applications* **42**: 305–316. {*364*}

Lurie, K. A., and Cherkaev, A. V. (1985). Optimization of properties of multicomponent isotropic composites, *Journal of Optimization Theory and Applications* **46**(4): 571–580. {*183, 187, 309, 314, 318, 342*}

Lurie, K. A., and Cherkaev, A. V. (1986a). Effective characteristics of composite materials and the optimal design of structural elements. (russian), *Uspekhi Mekhaniki = Advances in Mechanics* **9**: 3–81. English translation in (Lurie and Cherkaev, 1997). {*67, 81, 121, 135, 214, 265, 270, 272, 274, 277, 516*}

Lurie, K. A., and Cherkaev, A. V. (1986b). Exact estimates of the conductivity of a binary mixture of isotropic materials, *Proceedings of the Royal Society of Edinburgh. Section A, Mathematical and Physical Sciences* **104**(1-2): 21–38. Published earlier as (Lurie and Cherkaev, 1984a). {*515*}

Lurie, K. A., and Cherkaev, A. V. (1987). Errata corrigé. On *G*-closure: "*G*-closure of a set of anisotropically conducting media in the two-dimensional case" [J. Optim. Theory Appl. **42** (1984), no. 2, 283–304; MR 87c:73063a] and "*G*-closure of some particular sets of admissible material characteristics for the problem of bending of thin elastic plates" [ibid. **42** (1984), no. 2, 305–316; MR 87c:73063b], *Journal of Optimization Theory and Applications* **53**(2): 319–327. See (Lurie and Cherkaev, 1984c; Lurie and Cherkaev, 1984d). {*515*}

Lurie, K. A., and Cherkaev, A. V. (1988). On a certain variational problem of phase equilibrium, in J. M. Ball (ed.), *Material instabilities in continuum mechanics (Edinburgh, 1985–1986)*, Oxford Sci. Publ., Oxford Univ. Press, New York, pp. 257–268. {*214, 321*}

Lurie, K. A., and Cherkaev, A. V. (1997). Effective characteristics of composite materials and the optimal design of structural elements [partial translation

of MR 88e:73019], in A. V. Cherkaev, and R. V. Kohn (eds), *Topics in the mathematical modelling of composite materials*, Vol. 31 of *Progress in nonlinear differential equations and their applications*, Birkhäuser, Boston, MA, pp. 175–258. Translation. Originally published as (Lurie and Cherkaev, 1986a). {*515*}

Lurie, K. A., Cherkaev, A. V., and Fedorov, A. V. (1982). Regularization of optimal design problems for bars and plates. I, II, *Journal of Optimization Theory and Applications* **37**(4): 499–522, 523–543. The first and the second parts were separately published as (Lurie et al., 1980b) and (Lurie et al., 1980a). {*92, 121, 183, 189, 220, 240, 364, 516*}

Lurie, K. A., Cherkaev, A. V., and Fedorov, A. V. (1984). On the existence of solutions to some problems of optimal design for bars and plates, *Journal of Optimization Theory and Applications* **42**(2): 247–281. {*121*}

Lurie, K. A., Fedorov, A. V., and Cherkaev, A. V. (1980a). On the existence of solutions of certain optimal design problems for bars and plates, *Report 668*, Ioffe Physico-technical Institute, Acad of Sc, USSR, Leningrad, USSR. In Russian. English translation in (Lurie et al., 1982), part II. {*81, 213, 516*}

Lurie, K. A., Fedorov, A. V., and Cherkaev, A. V. (1980b). Relaxation of optimal design problems for bars and plates and eliminating of contradictions in the necessary conditions of optimality, *Report 667*, Ioffe Physico-technical Institute, Acad of Sc, USSR, Leningrad, USSR. In Russian. English translation in (Lurie et al., 1982), part I. {*81, 94, 516*}

Marcellini, P. (1985). Approximation of quasiconvex functions, and lower semicontinuity of multiple integrals, *Manuscripta Mathematica* **51**(1-3): 1–28. {*158*}

Marino, A., and Spagnolo, S. (1969). Un tipo di approssimazione dell'operatore $\sum_1^n ij D_i(a_{ij}(x)D_j)$ con operatori $\sum_1^n j D_j(\beta(x)D_j)$, *Ann. Scuola Norm. Sup. Pisa (3)* **23**: 657–673. {*64*}

Markenscoff, X. (1997/98). On the shape of the Eshelby inclusions, *Journal of Elasticity* **49**(2): 163–166. {*412*}

Markenscoff, X., and Paukshto, M. (1998). The wedge paradox and a correspondence principle, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* **454**(1968): 147–154. {*417*}

Markov, K., and Inan, E. (eds) (1999). *Proceedings of the Ninth International Symposium on Continuum Models and Discrete Systems: 29 June–3 July 1998, Istanbul, Turkey*, World Scientific Publishing Co., Singapore; Philadelphia; River Edge, NJ. {*47, 63*}

Markov, K., and Preziosi, L. (eds) (1999). *Heterogeneous Media: Micromechanics Modelling Methods and Simulation*, Birkhäuser Verlag, Basel, Switzerland. {*47, 63*}

Matos, J. P. (1992). Young measures and the absence of fine microstructures in a class of phase transitions, *European Journal of Applied Mathematics* **3**(1): 31–54. {*164*}

Mendelson, K. S. (1975). A theorem on the conductivity of two-dimensional heterogeneous medium, *Journal of Applied Physics* **46**: 4740–4741. {*304*}

Mikhlin, S. G. (1964). *Variational methods in mathematical physics*, The Macmillan Co., New York. Translated by T. Boddington; editorial introduction by L. I. G. Chambers. A Pergamon Press Book. {*10*}

Milgrom, M. (1997). Some more exact results concerning multifield moduli of two-phase composites, *Journal of the Mechanics and Physics of Solids* **45**(3): 399–404. {*296, 305*}

Milgrom, M., and Shtrikman, S. (1989). Linear response of polycrystals to coupled fields: Exact relations among the coefficients, *Physical Review B (Solid State)* **40**(9): 5991–5994. {*72, 296, 305*}

Milton, G. W. (1980). Bounds on complex dielectric constant of a composite material, *Applied Physics Letters* **37**(3): 300–302. {*57, 288, 296, 310, 343*}

Milton, G. W. (1981a). Bounds on the complex permittivity of a two-component composite material, *Journal of Applied Physics* **52**: 5286–5293. {*183, 198, 200, 296, 343*}

Milton, G. W. (1981b). Bounds on the electromagnetic, elastic and other properties of two-component composites, *Physical Review Letters* **46**(8): 542–545. {*283, 296, 431*}

Milton, G. W. (1981c). Bounds on the transport and optical properties of a two-component composite material, *Journal of Applied Physics* **52**: 5294–5304. {*198, 200, 296, 304*}

Milton, G. W. (1981d). Concerning bounds on transport and mechanical properties of multicomponent composite materials, *Applied Physics* **A26**: 125–130. {*309, 314, 317–319, 342*}

Milton, G. W. (1986). Modelling the properties of composites by laminates, in J. Ericksen et al. (eds), *Homogenization and Effective Moduli of Materials and Media (Minneapolis, Minn., 1984/1985)*, Springer-Verlag, Berlin; Heidelberg; London; etc., pp. 150–175. {*189, 277*}

Milton, G. W. (1987). Multicomponent composites, electrical networks and new types of continued fraction. I, *Communications in Mathematical Physics* **111**(2): 281–327. {*309, 342*}

Milton, G. W. (1990a). A brief review of the translation method for bounding effective elastic tensors of composites, *Continuum models and discrete systems, Vol. 1 (Dijon, 1989)*, Longman Sci. Tech., Harlow, pp. 60–74. {*214*}

Milton, G. W. (1990b). On characterizing the set of possible effective tensors of composites: the variational method and the translation method, *Communications on Pure and Applied Mathematics (New York)* **43**(1): 63–125. {*195, 214, 229, 235, 425, 426*}

Milton, G. W. (1991a). The field equation recursion method, *Composite media and homogenization theory (Trieste, 1990)*, Birkhäuser Boston, Boston, MA, pp. 223–245. {*193*}

Milton, G. W. (1991b). A proof that laminates generates all possible effective conductivity functions of two dimensional two-phase materials, *Advances in Multiphase Flow and Related Problems*, Vol. 5 of *Progress in Non-linear Differential Equations and Their Applications*, SIAM Press, Philadelphia, PA, pp. 136–146. {*189, 198*}

518      References

Milton, G. W. (1992). Composite materials with Poisson's ratios close to −1, *Journal of the Mechanics and Physics of Solids* **40**(5): 1105–1137. {*47, 201, 371, 389, 390, 477*}

Milton, G. W. (1994). A link between sets of tensors stable under lamination and quasiconvexity, *Communications on Pure and Applied Mathematics (New York)* **47**(7): 959–1003. {*183, 189, 270, 272*}

Milton, G. W. (2000). *Effective properties of composites*, Cambridge University Press, Cambridge, UK. in preparation. {*176, 220, 277*}

Milton, G. W., and Berryman, J. G. (1997). On the effective viscoelastic moduli of two-phase media. II. Rigorous bounds on the complex shear modulus in three dimensions, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* **453**(1964): 1849–1880. {*344, 353, 431*}

Milton, G. W., and Cherkaev, A. V. (1995). What elasticity tensors are realizable?, *Journal of Engineering Materials and Technology* **117**(4): 483–493. {*202, 204, 387, 390, 477*}

Milton, G. W., and Golden, K. (1985). Thermal conduction in composites, *Thermal Conductivity*, Vol. 18, Plenum Press, New York; London, pp. 571–582. {*193*}

Milton, G. W., and Golden, K. (1990). Representations for the conductivity functions of multicomponent composites, *Communications on Pure and Applied Mathematics (New York)* **43**(5): 647–671. {*195, 309, 343*}

Milton, G. W., and Kohn, R. V. (1988). Variational bounds on the effective moduli of anisotropic composites, *Journal of the Mechanics and Physics of Solids* **36**(6): 597–629. {*309, 316, 317, 339, 384*}

Milton, G. W., and Movchan, A. B. (1995). A correspondence between plane elasticity and the two-dimensional real and complex dielectric equations in anisotropic media, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* **450**(1939): 293–317. {*220, 371*}

Milton, G. W., and Movchan, A. B. (1998). Mapping certain planar elasticity problems to antiplane ones, *European Journal of Mechanics, A, Solids.* **17**(1): 1–11. {*220*}

Milton, G. W., and Nesi, V. (1999). Optimal G-closure bounds via stability under lamination, *Archive for Rational Mechanics and Analysis* . in print. {*309, 341*}

Milton, G. W., and Serkov, S. K. (1999). Bounding the current in nonlinear conducting composites, *Applied Mechanics Reviews* . submitted. {*63, 76*}

Morrey, C. B. (1952). Quasi-convexity and the lower semicontinuity of multiple integrals, *Pacific Journal of Mathematics* **2**: 25–53. {*158, 159, 166, 214*}

Morrey, C. B. (1966). *Multiple integrals in the calculus of variations*, Springer-Verlag, New York. Die Grundlehren der mathematischen Wissenschaften, Band 130. {*218*}

Movchan, A. B., and Movchan, N. V. (1995). *Mathematical modelling of solids with nonregular boundaries*, CRC Press, 2000 N.W. Corporate Blvd., Boca Raton, FL 33431-9868. {*242*}

Müller, S., and Fonseca, I. (1998). A-quasiconvexity, lower semicontinuity and Young measures, *Preprint*, Max-Planck-Institut für Mathematik in der Naturwissenshaften, Leipzig, Germany. {*158*}

Murat, F. (1972). Théorèmes de non-existence pour des problèmes de contrôle dans les coefficients, *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences. Séries A et B* **274**: A395–A398. {*122*}

Murat, F. (1977). Contre-examples pour divers problèmes où le contrôle intervient dans les coefficients, *Annali di Matematica Pura ed Applicata. Series 4* pp. 49–68. {*81, 122, 214*}

Murat, F. (1981). Compacité par compensation: condition nécessaire et suffisante de continuité faible sous une hypothèse de rang constant, *Annali della Scuola Normale Superiore di Pisa, Classe di Scienze* **8**(1): 69–102. {*133, 150, 220*}

Murat, F., and Tartar, L. (1985a). Calcul des variations et homogénéisation, **57**: 319–369. English translation as (Murat and Tartar, 1997). {*81, 158, 192, 214, 222, 280, 519*}

Murat, F., and Tartar, L. (1985b). Optimality conditions and homogenization, *Nonlinear variational problems (Isola d'Elba, 1983)*, Pitman Publishing Ltd., London, pp. 1–8. {*121, 158*}

Murat, F., and Tartar, L. (1997). Calculus of variations and homogenization, in A. V. Cherkaev, and R. V. Kohn (eds), *Topics in the mathematical modeling of composite materials*, Vol. 31 of *Progress in nonlinear differential equations and their applications*, Birkhäuser, Boston, pp. 139–173. Translation. The original publication in (Murat and Tartar, 1985a). {*108, 519*}

Muskhelishvili, N. I. (1943). *Some basic problems of the mathematical theory of elasticity*, Noordhoff, Groningen. {*414, 417*}

Muskhelishvili, N. I. (1953). *Some basic problems of the mathematical theory of elasticity*, P. Noordhoff Ltd., Groningen-Holland. {*373*}

Nemat-Nasser, S., and Hori, M. (1993). *Micromechanics: Overall properties of heterogeneous materials*, North-Holland Publishing Co., Amsterdam, The Netherlands. {*47, 63, 425*}

Nesi, V. (1995). Bounds on the effective conductivity of two-dimensional composites made of $n \geq 3$ isotropic phases in prescribed volume fraction: the weighted translation method, *Proceedings of the Royal Society of Edinburgh. Section A, Mathematical and Physical Sciences* **125**(6): 1219–1239. {*309, 319*}

Nesi, V., and Milton, G. W. (1991). Polycrystalline configurations that maximize electrical resistivity, *Journal of the Mechanics and Physics of Solids* **39**(4): 525–542. {*200, 294, 323, 325, 341*}

Norris, A. N. (1985). A differential scheme for the effective moduli of composites, *Mechanics of Materials: An International Journal* **4**: 1–16. {*183*}

Norris, A. N. (1999). Stress invariance and redundant moduli in three-dimensional elasticity, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* . In print. {*372*}

Oleĭnik, O. A., Yosifian, G. A., and Temam, R. (1995). Some nonlinear homogenization problems, *Applicable Analysis* **57**(1-2): 101–118. {*63*}

Olhoff, N. (1974). Optimal design of vibrating rectangular plates, *International Journal of Solids and Structures* **10**: 93–109. {*479*}

Olhoff, N., and Rasmussen, S. H. (1977). On bimodal optimum loads of clamped columns, *International Journal of Solids and Structures* **13**: 605–514. {*487*}

Olhoff, N., Scheel, J., and Rønholt, E. (1998). Topology optimization of three-dimensional structures using optimum microstructures, *Structural Optimization* **16**: 1–18. {*405*}

Olhoff, N., and Taylor, J. E. (1979). On optimal structural remodeling, *Journal of Optimization Theory and Applications* **27**(4): 571–582. {*xxiii, 404*}

Panasenko, G. P. (1994). Homogenization of lattice-like domains: L-convergence, *Report CNRS URA 740, 178*, Equipe d'Analyse Numérique, Lyon/Saint-Etienne. {*47*}

Papalambros, P. Y., and Wilde, D. J. (1988). *Principles of optimal design*, Cambridge University Press, Cambridge, UK. Modeling and computation. {*xxiii, 461*}

Parry, G. P. (1995). On the planar rank-one convexity condition, *Proceedings of the Royal Society of Edinburgh. Section A, Mathematical and Physical Sciences* **125**(2): 247–264. {*155*}

Parton, V. Z., and Perlin, P. I. (1984a). *Mathematical methods of the theory of elasticity. Vol. 1*, "Mir", Moscow. Translated from the Russian by Ram S. Wadhwa. {*359*}

Parton, V. Z., and Perlin, P. I. (1984b). *Mathematical methods of the theory of elasticity. Vol. 2*, "Mir", Moscow. Translated from the Russian by Ram S. Wadhwa. {*359*}

Pedersen, P. (1989). On optimal orientation of orthotropic materials, *Structural Optimization* **1**: 101–106. {*450*}

Pedersen, P. (1990). Bounds on elastic energy in solids of orthotropic materials, *Structural Optimization* **2**: 55–63. {*450*}

Pedersen, P. (1991). On thickness and orientational design with orthotropic materials, *Structural Optimization* **3**: 69–78. {*450*}

Pedersen, P., and Taylor, J. E. (1993). Optimal design based on power-law nonlinear elasticity, in P. Pedersen (ed.), *Optimal Design with Advanced Materials*, Elsevier, Amsterdam, The Netherlands, pp. 51–66. {*xxiii*}

Pedregal, P. (1997). *Parametrized measures and variational principles*, Birkhäuser Verlag, Basel, Switzerland. {*64, 118, 145, 155, 158, 164, 165*}

Pedregal, P., and Šverák, V. (1998). A note on quasiconvexity and rank-one convexity for $2 \times 2$ matrices, *Journal of Convex Analysis* **5**(1): 107–117. {*155, 217*}

Petukhov, L. V. (1989). Optimal elastic regions of maximum rigidity, *Prikladnaia Matematika i Mekhanika (PMM)= Applied Mathematics and Mechanics* **53**(1): 88–95. {*395*}

Petukhov, L. V. (1995). Necessary Weierstrass conditions for elliptic systems, *Prikladnaia Matematika i Mekhanika (PMM)= Applied Mathematics and Mechanics* **59**(5): 742–749. {*240*}

Pólya, G., and Szegö, G. (1951). *Isoperimetric Inequalities in Mathematical Physics*, Vol. 27 of *Annals of Mathematics Studies*, Princeton University Press, Princeton, NJ. {*10*}

Ponte Castañeda, P. (1992a). Bounds and estimates for the properties of nonlinear heterogeneous systems, *Philosophical Transactions of the Royal Society of London Series A* **340**(1659): 531–567. {*xxiii*}

Ponte Castañeda, P. (1992b). A new variational principle and its application to nonlinear heterogeneous systems, *SIAM Journal on Applied Mathematics* **52**(5): 1321–1341. {*xxiii*}

Ponte Castañeda, P. (1996). Exact second-order estimates for the effective mechanical properties of nonlinear composite materials, *Journal of the Mechanics and Physics of Solids* **44**(6): 827–862. {*xxiii, 63*}

Ponte Castañeda, P. (1997). Nonlinear composite materials: effective constitutive behavior and microstructure evolution, *Continuum micromechanics*, Springer-Verlag, Vienna, pp. 131–195. {*xxiii, 63*}

Ponte Castañeda, P., and Willis, J. R. (1988). On the overall properties of nonlinearly viscous composites, *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences* **416**(1850): 217–244. {*xxiii, 63*}

Pontryagin, L. S., Boltyanskii, V. G., Gamkrelidze, R. V., and Mishchenko, E. F. (1964). *The mathematical theory of optimal processes*, A Pergamon Press Book. The Macmillan Co., New York. Translated by D. E. Brown. {*92, 240*}

Prager, W. (1968). Optimality criteria in structural design, *Proceedings of the National Academy of Sciences of the United States of America* **61**(3): 794–796. {*413, 414*}

Prager, W. (1974). *Introduction to structural optimization*, Springer-Verlag, Vienna. Course held at the Department of Mechanics of Solids, International Centre for Mechanical Sciences, Udine, October, 1974, International Centre for Mechanical Sciences, Courses and Lectures, No. 212. {*461*}

Raĭtum, U. Ė. (1978). Extension of extremal problems connected with linear elliptic equations, *Doklady Akademii Nauk SSSR* **243**(2): 281–283. {*67, 73, 122, 123*}

Raĭtum, U. Ė. (1979). On optimal control problems for linear elliptic equations, *Doklady Akademii Nauk SSSR* **244**(4): 828–830. {*121*}

Raĭtum, U. Ė. (1989). *Optimal control problems for elliptic equations*, "Zinatne", Riga. In Russian. {*76*}

Raĭtum, U. Ė. (1999). On the local representation of *G*-closure, *Technical Report 206*, Department of mathematics, University of Jyväskylä, Jyväskylä, Finland. {*64*}

Reshetnyak, Y. G. (1967). General theorems on semi-continuity and quasiconvexity of functionals, *Sibirskii Matematicheskii Zhurnal* **8**: 801–816. {*158, 218*}

Reuss, A. (1929). Berechnung der Fliessgrenze von Mischkristallen auf Grund Plastizitätsbedingung für Einkristalle, *Zeitschrift für Angewandte Mathematik und Mechanik* **9**(1): 49–58. {*62*}

Rockafellar, R. (1966). Extension of Fenchel's duality theorem for convex functions, *Duke Mathematical Journal* **33**: 81–89. {*30*}

Rockafellar, R. (1967). Duality and stability in extremum problems involving convex functions, *Pacific Journal of Mathematics* **21**: 167–187. {*29, 352*}

Rockafellar, R. (1997). *Convex analysis*, Princeton University Press, Princeton, NJ. Reprint of the 1970 original, Princeton Paperbacks. {*8, 16, 17, 29, 31, 103, 352*}

Rodrigues, H. C., Soto, C. A., and Taylor, J. E. (1999). A design model to predict optimal two-material composite structure, *Structural Optimization* **17**: 186–198. {*461, 466*}

Rosakis, P., and Simpson, H. C. (1994/95). On the relation between polyconvexity and rank-one convexity in nonlinear elasticity, *Journal of Elasticity* **37**(2): 113–137. {*155*}

Roubíček, T. (1997). *Relaxation in optimization theory and variational calculus*, Walter de Gruyter & Co., Berlin. {*145*}

Rozonoèr, L. I. (1959). L. S. Pontryagin maximum principle in the theory of optimum systems. I, II, III, *Automatic and Remote Control* **20**: 1288–1302, 1405–1421, 1517–1532. {*92, 240*}

Rozvany, G. I. N. (1989). *Structural design via optimality criteria*, Kluwer Academic Publishers Group, Dordrecht. Boston. London. The Prager approach to structural optimization. {*xxiii, 461*}

Rozvany, G. I. N., Bendsøe, M. P., and Kirsch, U. (1995). Layout optimization of structures, *Applied Mechanics Reviews* **48**(2): 41–119. {*450, 461, 466*}

Rozvany, G. I. N., Olhoff, N., Bendsøe, M. P. et al. (1987). Least weight design of perforated elastic plates, *International Journal of Solids and Structures* **23**: 521–536 (part I) and 537–550 (part II). {*466*}

Rykhlevskiĭ, Y. (1988). Symmetry of tensor functions and a spectral theorem, *Uspekhi Mekhaniki = Advances in Mechanics* **11**(3): 77–125. {*370*}

Ryzhik, L., Papanicolaou, G., and Keller, J. (1996). Transport equations for elastic and other waves in random media, *Wave Motion* **24**(4): 327–370. {*47*}

Sánchez-Palencia, E. (1980). *Nonhomogeneous media and vibration theory*, Springer-Verlag, Berlin. {*xxiii, 45*}

Sawicz, R., and Golden, K. (1995). Bounds on the complex permittivity of matrix-particle composites, *Journal of Applied Physics* **78**: 7240–7246. {*343*}

Schulgasser, K. (1976). Relationship between single-crystal and polycrystal electrical conductivity, *Journal of Applied Physics* **47**: 1880–1886. {*xxiii, 183, 294, 342*}

Schulgasser, K. (1977). Bounds on the conductivity of statistically isotropic polycrystals, *Journal of Physics C: Solid State Physics* **10**: 407–417. {*183, 294, 314*}

Seyranian, A. P. (1987). Multiple eigenvalues in optimization problems, *Prikladnaia Matematika i Mekhanika (PMM)= Applied Mathematics and Mechanics* **51**: 272–275. {*487*}

Seyranian, A. P., Lund, E., and Olhoff, N. (1994). Multiple eigenvalues in structural optimization problems, *Structural Optimization* **8**(4): 207–227. {*479, 487*}

Shilov, G. E. (1996). *Elementary functional analysis*, Dover Publications, Inc., New York. Revised English edition translated from the Russian and edited by Richard A. Silverman, Corrected reprint of the 1974 English translation. {*21, 38*}

Sigmund, O. (1994). Materials with prescribed constitutive parameters: an inverse homogenization problem, *International Journal of Solids and Structures* **31**(17): 2313–2329. {*479*}

Sigmund, O. (1996). Some inverse problems in topology design of materials and mechanisms, *IUTAM Symposium on Optimization of Mechanical Systems (Stuttgart, 1995)*, Kluwer Academic Publishers Group, Dordrecht. Boston. London, pp. 277–284. {*390, 479*}

Sigmund, O. (1997). On the design of compliant mechanisms using topology optimization, *Mechanics of Structures and Machines* **25**(4): 495–526. {*479*}

Sigmund, O. (1998). A new class of extremal composites, *Report 599*, DCAMM, Technical University of Denmark. {*212, 430*}

Sigmund, O., and Petersson, J. (1998). Numerical instabilities in topology optimization: A survey on procedures dealing with checkerboards, mesh-dependencies and local minima, *Structural Optimization* **16**: 68–75. A review. {*466*}

Sigmund, O., and Torquato, S. (1997). Design of materials with extreme thermal expansion using a three-phase topology optimization method, *Journal of the Mechanics and Physics of Solids* **45**(6): 1037–1067. {*47, 390, 479*}

Šilhavý, M. (1997). *The mechanics and thermodynamics of continuous media*, Springer-Verlag, Berlin. {*359*}

Šilhavý, M. (1998). Polar decomposition of rank 1 perturbations in two dimensions, *Mathematics and Mechanics of Solids : MMS* **3**(1): 107–112. {*155*}

Smyshlyaev, V. P., and Willis, J. R. (1999). On the relaxation of a three-well energy, *R. Soc. Lond. Proc. Ser. A Math. Phys. Eng. Sci.* **455**(1983): 779–814. {*309*}

Sokolnikoff, I. S. (1983). *Mathematical theory of elasticity*, second edn, Robert E. Krieger Publishing Co. Inc., Melbourne, Fla. {*110, 359*}

Strang, G. (1976). *Linear algebra and its applications*, Academic Press [Harcourt Brace Jovanovich Publishers], New York. {*305*}

Strang, G. (1986). *Introduction to applied mathematics*, Wellesley-Cambridge Press, Wellesley, MA. {*27*}

Strang, G., and Kohn, R. V. (1988). Optimal design of a two-way conductor, in J. Moreau et al. (eds), *Topics in Nonsmooth Mechanics*, Birkhäuser, pp. 143–155. {*189, 214*}

Suzuki, K., and Kikuchi, N. (1991). A homogenization method for shape and topology optimization, *Computer Methods in Applied Mechanics and Engineering* **93**: 291–318. {*395*}

Šverák, V. (1992a). New examples of quasiconvex functions, *Archive for Rational Mechanics and Analysis* **119**(4): 293–300. {*158, 217*}

Šverák, V. (1992b). Rank-one convexity does not imply quasiconvexity, *Proceedings of the Royal Society of Edinburgh. Section A, Mathematical and Physical Sciences* **120**(1-2): 185–189. {*155, 176*}

Šverák, V. (1993). On optimal shape design, *Journal de Mathématiques Pures et Appliquées* **72**(6): 537–551. {*466*}

Talbot, D. R. S., and Willis, J. R. (1985). Variational principles for inhomogeneous nonlinear media, *IMA Journal of Applied Mathematics* **35**(1): 39–54. {*63*}

Talbot, D. R. S., and Willis, J. R. (1992). Some simple explicit bounds for the overall behaviour of nonlinear composites, *International Journal of Solids and Structures* **29**(14-15): 1981–1987. {*xxiii, 63*}

Talbot, D. R. S., and Willis, J. R. (1995). Upper and lower bounds for the overall properties of a nonlinear elastic composite, *Anisotropy, inhomogeneity and nonlinearity in solid mechanics (Nottingham, 1994)*, Kluwer Academic Publishers Group, Dordrecht. Boston. London, pp. 409–414. {*63*}

Talbot, D. R. S., and Willis, J. R. (1996). Three-point bounds for the overall properties of a nonlinear composite dielectric, *IMA Journal of Applied Mathematics* **57**(1): 41–52. {*xxiii*}

Talbot, D. R. S., and Willis, J. R. (1997). Bounds of third order for the overall response of nonlinear composites, *Journal of the Mechanics and Physics of Solids* **45**(1): 87–111. {*xxiii, 63*}

Talbot, D. R. S., Willis, J. R., and Nesi, V. (1995). On improving the Hashin-Shtrikman bounds for the effective properties of three-phase composite media, *IMA Journal of Applied Mathematics* **54**(1): 97–107. {*xxiii, 63, 319*}

Tartar, L. (1975). Problèmes de contrôle des coefficients dans des équations aux dérivées partielles, **107**: 420–426. {*67, 73, 122, 214*}

Tartar, L. (1979a). Compensated compactness and applications to partial differential equations, *Nonlinear analysis and mechanics: Heriot-Watt Symposium, Vol. IV*, Pitman Publishing Ltd., London, pp. 136–212. {*133, 220*}

Tartar, L. (1979b). Estimation de coefficients homogénéisés, *Computing methods in applied sciences and engineering (Proc. Third Internat. Sympos., Versailles, 1977), I,*, Vol. 704 of *Lecture Notes in Mathematics*, Springer-Verlag, Berlin; Heidelberg; London; etc., pp. 364–373. English translation published in (Tartar, 1997). {*214*}

Tartar, L. (1983). The compensated compactness method applied to systems of conservation laws, *Systems of nonlinear partial differential equations (Oxford, 1982)*, Reidel, Dordrecht, pp. 263–285. {*222*}

Tartar, L. (1985). Estimation fines des coefficients homogénéisés, in P. Kree (ed.), *E. De Giorgi colloquium (Paris, 1983)*, Pitman Publishing Ltd., London, pp. 168–187. {*214, 228, 280, 284, 288*}

Tartar, L. (1986). Oscillations in nonlinear partial differential equations: compensated compactness and homogenization, *Nonlinear systems of partial differential equations in applied mathematics, Part 1 (Santa Fe, NM, 1984)*, American Mathematical Society, Providence, RI, pp. 243–266. {*150*}

Tartar, L. (1987). The appearance of oscillations in optimization problems, *Nonclassical continuum mechanics (Durham, 1986)*, Cambridge University Press, Cambridge, UK, pp. 129–150. {*121*}

Tartar, L. (1989). Nonlocal effects induced by homogenization, *Partial differential equations and the calculus of variations, Vol. II*, Birkhäuser Boston, Boston, MA, pp. 925–938. {*222*}

Tartar, L. (1990). *H*-measures, a new approach for studying homogenisation, oscillations and concentration effects in partial differential equations, *Proceedings of the Royal Society of Edinburgh. Section A, Mathematical and Physical Sciences* **115**(3-4): 193–230. {*64*}

Tartar, L. (1992). On mathematical tools for studying partial differential equations of continuum physics: *H*-measures and Young measures, *Developments in partial differential equations and applications to mathematical physics (Ferrara, 1991)*, Plenum, New York, pp. 201–217. {*164*}

Tartar, L. (1993). Some remarks on separately convex functions, in D. Kinderlehrer, R. James, M. Luskin, and J. L. Ericksen (eds), *Microstructure and phase transition*, Springer-Verlag, New York, pp. 191–204. {*155, 323*}

Tartar, L. (1994). Remarks on optimal design problems, in G. Buttazzo, G. Bouchitte, and P. Suquet (eds), *Calculus of variations, homogenization and continuum mechanics*, Vol. 18 of *Series on advances in mathematics for applied sciences*, World Scientific Publishing Co., Singapore; Philadelphia; River Edge, NJ, pp. 279–296. {*121*}

Tartar, L. (1995). Beyond Young measures, *Meccanica (Milan)* **30**(5): 505–526. Microstructure and phase transitions in solids (Udine, 1994). {*164*}

Tartar, L. (1997). Estimation of homogenized coefficients, in A. V. Cherkaev, and R. V. Kohn (eds), *Topics in the mathematical modeling of composite materials*, Vol. 31 of *Progress in nonlinear differential equations and their applications*, Birkhäuser, Boston, pp. 9–20. {*222, 524*}

Taylor, J. E. (1993). A global extremum principle for the analysis of solids composed of softening material, *International Journal of Solids and Structures* **30**(15): 2057–2069. {*xxiii*}

Taylor, J. E. (1996). Surface motion due to crystalline surface energy gradient flows, *Elliptic and parabolic methods in geometry (Minneapolis, MN, 1994)*, A. K. Peters, Ltd., Wellesley, MA, pp. 145–162. {*145*}

Taylor, J. E. (1998). An energy model for the optimal design of linear continuum structures, *Structural Optimization* **16**: 116–127. {*370, 466*}

Taylor, J. E. (1999). Optimal modification and evolution of elastic continuum structures, in P. Pedersen, and M. P. Bendsøe (eds), *Synthesis in bio solid mechanics*, Solid mechanics and its applications, Kluwer Academic Publishers Group, Dordrecht. Boston. London, pp. 115–128. {*xxiii*}

Telega, J. J. (1990). Variational methods and convex analysis in contact problems and homogenization, *IFTR Reports* **38**: 119–134. {*47*}

Telega, J. J. (1995). Epi - limit on HB and homogenization of heterogeneous plastic plates, *Nonlinear Analysis, Theory, Methods and Applications* **25**: 499–529. {*63*}

Timoshenko, S. P. (1970). *Theory of elasticity*, McGraw-Hill, New York. {*4, 359*}

Torquato, S. (1999). Diffusion-controlled reaction and flows in porous media, in K. Markov, and L. Preziosi (eds), *Heterogeneous Media: Micromechanics Modelling Methods and Simulation*, Birkhäuser Verlag, Basel, Switzerland. {*47, 63*}

Torquato, S., and Rubinstein, J. (1991). Improved bounds on the effective conductivity of high-contrast suspensions, *Journal of Applied Physics* **69**: 7118–7125. {*306*}

Tortorelli, D. A., and Wang, Z. (1993). A systematic approach to shape sensitivity analysis, *International Journal of Solids and Structures* **30**(9): 1181–1212. {*461*}

Truesdell, C. A. (1991). *A first course in rational continuum mechanics. Vol. 1*, second edn, Academic Press, New York. General concepts. {*359*}

Truesdell, C. A., and Toupin, R. (1960). The classical field theories, *Handbuch der Physik, Bd. III/1*, Springer-Verlag, Berlin, pp. 226–793; appendix, pp. 794–858. With an appendix on tensor fields by J. L. Ericksen. {*360, 375*}

Truesdell, C., and Noll, W. (1965). The non-linear field theories of mechanics, *Handbuch der Physik, Band III/3*, Springer-Verlag, Berlin, pp. 1–602. {*359*}

Truskinovsky, L., and Zanzotto, G. (1996). Ericksen's bar revisited: energy wiggles, *Journal of the Mechanics and Physics of Solids* **44**(8): 1371–1408. {*321*}

van Keulen, F., Polynkine, A. A., and Toropov, V. V. (1997). Shape optimization with adaptive mesh refinement: Target error selection strategies, *Engineering Optimization* **28**: 95–125. {*461*}

Vigdergauz, S. B. (1986). Effective elastic parameters of a plate with a regular system of equal-strength holes, *Izvestiia Akademii Nauk SSSR. Mekhanika Tverdogo Tela* **21**(2): 165–169. {*412*}

Vigdergauz, S. B. (1988). Stressed state of an elastic plane with constant-stress holes, *Izvestiia Akademii Nauk SSSR. Mekhanika Tverdogo Tela* **23**(3): 96–99. {*283, 412, 414, 415*}

Vigdergauz, S. B. (1989). Regular structures with extremal elastic properties, *Izvestiia Akademii Nauk SSSR. Mekhanika Tverdogo Tela* **24**(3): 57–63. {*310, 412, 414*}

Vigdergauz, S. B. (1994a). Three-dimensional grained composites of extreme thermal properties, *Journal of the Mechanics and Physics of Solids* **42**(5): 729–740. {*412, 414*}

Vigdergauz, S. B. (1994b). Two-dimensional grained composites of extreme rigidity, *Journal of Applied Mechanics* **61**(2): 390–394. {*412*}

Vigdergauz, S. B. (1996). Rhombic lattice of equi-stress inclusions in an elastic plate, *Quarterly Journal of Mechanics and Applied Mathematics* **49**(4): 565–580. {*412*}

Vigdergauz, S. B., and Cherkaev, A. V. (1986). A hole in a plate, optimal for its biaxial extension-compression, *Prikladnaia Matematika i Mekhanika (PMM)= Applied Mathematics and Mechanics* **50**(3): 524–528. {*412, 417*}

Voigt, W. (1928). *Lehrbuch der Kristallphysik*, Teubner, Stuttgart; Leipzig. {*xxiii, 62*}

von Neumann, J., and Morgenstern, O. (1980). *Theory of games and economic behavior*, third edn, Princeton University Press, Princeton, NJ. {*106*}

Walpole, L. (1966). On bounds for the overall elastic moduli of inhomogeneous systems I and II, *Journal of the Mechanics and Physics of Solids* **14**: 151–162, 289–301. {*427*}

Warga, J. (1972). *Optimal control of differential and functional equations*, Academic Press, New York. {*14*}

Weinstock, R. (1974). *Calculus of variations*, Dover Publications, Inc., New York. With applications to physics and engineering, Reprint of the 1952 edition. {*xxv, 10*}

Wiener, W. (1912). Die Theorie des Mischkörpers für das Feld des stationaären Störmung. Erste Abhandlung die Mittelswertsätze für Kraft, Polarization und Energie, *Abhandlungen der Mathematisch Physischen Klasse der Königlischen-Sachsischen Gesellschaft der Wissenschaften* **32**: 509–604. {*xxiii, 62, 67*}

Willis, J. R. (1981). Variational and related methods for the overall properties of composite materials, in C.-S. Yih (ed.), *Advances in Applied Mechanics*, Vol. 21, Academic Press, New York, pp. 2–78. {*xxiii*}

Young, L. C. (1942a). Generalized surfaces in the calculus of variations, *Annals of Mathematics (2)* **43**: 84–103. {*14, 164*}

Young, L. C. (1942b). Generalized surfaces in the calculus of variations. II, *Annals of Mathematics (2)* **43**: 530–544. {*14*}

Young, L. C. (1969). *Lectures on the calculus of variations and optimal control theory*, W. B. Saunders Co., Philadelphia. Foreword by Wendell H. Fleming. {*7, 14*}

Zhang, K. (1997). On non-negative quasiconvex functions with unbounded zero sets, *Proceedings of the Royal Society of Edinburgh. Section A, Mathematical and Physical Sciences* **127**(2): 411–422. {*217*}

Zhikov, V. V. (1986). Estimates for the trace of an averaged matrix, *Matematicheskie Zametki* **40**(2): 226–237, 287. {*214, 282, 316*}

Zhikov, V. V. (1988). Estimates for the trace of an averaged tensor, *Doklady Akademii Nauk SSSR* **299**(4): 796–800. {*384*}

Zhikov, V. V. (1991a). Estimates for an averaged matrix and an averaged tensor, *Russian Mathematical Surveys* **46**(3(279)): 49–109, 239. {*xxiii, 214*}

Zhikov, V. V. (1991b). Estimates for the homogenized matrix and the homogenized tensor, *Russian Mathematical Surveys* **46**(3): 65–136. {*309*}

Zhikov, V. V. (1993). Lavrent′ev phenomenon and homogenization for some variational problems, *Comptes Rendus des Séances de l'Académie des Sciences. Série I. Mathématique* **316**(5): 435–439. {*13, 162*}

Zhikov, V. V. (1995). On the averaging of nonlinear variational problems in punctured domains, *Doklady Akademii Nauk SSSR* **345**(2): 156–160. {*63*}

Zhikov, V. V. (1996). Connectedness and averaging. Examples of fractal conductivity, *Matematicheskii Sbornik / Izdavaemyi Moskovskim Matematicheskim Obshchestvom = Recueil Mathématique de la Société Mathématique de Moscou* **187**(8): 3–40. {*47*}

Zohdi, T. I., Oden, J. T., and Rodin, G. J. (1996). Hierarchical modeling of heterogeneous bodies, *Computer Methods in Applied Mechanics and Engineering* **138**(1-4): 273–298. {*47*}