Abstract

Understanding and Control of Random Lasing

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Random lasing attracts much attention because its fundamental significance for understanding coherent phenomena in disordered media and potential applications in optoelectronics because of easy preparation (no need in mirrors) and small size down to several microns. Since the first experimental demonstration by Cao and coworkers in 1998 of the lasing emission from the ZnO nanopowder the remarkable progress in studying the material, geometry and external pumping dependences of laser properties and efficiency has been reached. I will demonstrate that lasing occurs from the special random cavities of high quality formed within the active medium. They can be described as the decaying eigen optical modes within the medium and the optical mode having the minimum decay rate is responsible for lasing. Numerical and analytical studies of the properties of these modes permit to interpret existing experiments and suggest the ways to optimize the performance of lasers.

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