

First-Order-Like Transition for Dispersive Optical Bistability

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Abstract: The first-order-like phase transition (FOLT) in the dispersive optical bistability is investigated when the fluctuation in the incident light field is considered as colored noise. A unified colored-noise approximation is applied to obtain the steady state distribution (SSD) when either the intensity or phase fluctuations of the incident field are included in the system. For intensity fluctuations only, the curve of SSD is changed from single extreme to two extremes, and then to three extremes. The colored nature of the noise can reduce the fluctuation in the system. However, for phase fluctuations only, the FOLT is mainly induced by the colored nature of the noise. The curve of SSD is changed from single extreme to three extremes directly. There is no FOLT existing for white noise.

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Key words: dispersive optical bistability, first-order-like phase transition, intensity fluctuation, phase fluctuation

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