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Title:Tunability of terahertz random lasers with temperature based on superconducting materials
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Abstract:We theoretically demonstrate the tunabiltiy of terahertz random lasers composed of high temperature superconductor YBCO and ruby layers as active medium. The considered system is a one-dimensional disordered medium made of ruby grain and YBCO. Finite-difference time domain method is used to calculate the emission spectrum and spatial distribution of electric field at different temperatures. Our numerical results reveal that the superconductor based random lasers exhibit large temperature tunability in the terahertz domain. The emission spectrum is significantly temperature dependent, the number of lasing modes and their intensities increase with decreasing temperature. Also, we make some discussion to explain the reason for the observed tunability and the effect of temperature variation on the spatial distribution of the electric field in the disordered active medium. © 2012 American Institute of Physics.
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