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Controlled Spontaneous Emission M.A. ROHRDANZ, Walsh University, N. Canton, OH 44720, USA, J.-S. LEE, A. KHITRIN, Department of Chemistry, Kent State University, Kent, OH 44242, USA — The problem of spontaneous emission has been studied by numerical simulations. The dynamics of the combined system atom + radiation field, involving up to 15 k field oscillators, has been calculated by direct diagonalization of the Hamiltonian. Optimization of the discrete model's parameters was made by comparing results with the exact solution for the model with equidistant frequencies of the oscillators and equal coupling constants. A numerical approach made it possible to address problems too complex for analytical treatment, which involve interaction with external fields and emission by multi-atom systems. Our major findings are the following. 1) Irradiation by a periodic sequence of laser pulses may shift the frequency in a continuous way by attenuating the power of the pulses. 2) In a two-atom system, the linewidth of the emitted spectrum can be made arbitrary small, and can be regulated by changing a difference between the transition frequencies of the atoms. Therefore, both the frequency and linewidth of spontaneous emission can be controlled.

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