

# Turkish Journal of Physics

Turkish Journal

of

Physics

Dynamics of Stochastic Systems: Effect on Spectral Line Shapes

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**Abstract:** We present a theoretical approach to describe the dynamics of a system induced by stochastic couplings and undergoing dephasing processes. We consider a model frequently encountered in the study of non-radiative transitions in molecular systems, the case of two configurations stochastically coupled. In this model, we use a system whose excited radiant state is coupled stochastically to a non-radiant state of a lower electronic configuration. We show the line shape for stochastic non-diagonal perturbations to remain Lorentzian. This result is different from the case of frequency modulation where a transition from a Gaussian to a Lorentzian line shape can be observed.

**Key Words:** Non-radiative transition, stochastic approach, relaxation and dephasing processes, absorption spectrum.

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Turk. J. Phys., **31**, (2007), 137-150.

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