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Parity-Time (PT) Symmetric systems: An analysis of dimer and trimer models.

In the late 1990s, a novel idea came to fruition concerning the study of the fundamentals of quantum mechanics. In the works of Bender and Boettcher, it was proposed that Hamiltonians that respect the physical symmetries of the dynamics, namely parity (P) and time-reversal (T), could have real eigenvalues even if said Hamiltonian were non-Hermitian. In this talk, we will discuss the cases of two-site (dimer) and three-site (trimer) PT-symmetric models respecting the parity-time (PT) symmetry with linear and nonlinear gain/loss profiles. We also examine solutions arising from these dimer and trimer models and their regions of stability. In addition, we will examine both dimer and trimer models with a rapidly-varying gain/loss profile. In this part of the work, we discuss the derivation of a set of averaged equations and examine its solutions and stability regions. We also compare these results with those obtained by direct simulation of the full set of nonlinear equations. (Received December 17, 2016)