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Contact Interaction and Kronig-Penney Model in PT Quantum Mechanics FOSTER THOMPSON, HARSH MATHUR, Department of Physics Case Western Reserve University, KATHERINE BROWN, Department of Physics Hamilton College — We study two simple models of PT quantum mechanics that provide insight into the propagation of light through suitably engineered PT symmetric optical structures. We introduce the PT quantum mechanics analog of a delta function potential and analyze its bound and scattering states. This model can support up to two bound states (one more than the textbook delta function) and these states undergo the phenomenon of PT symmetry breaking wherein the two bound state energies degenerate and become a complex conjugate pair as parameters in the model are varied. The scattering states are also found to show PT symmetry breaking as the scattering phase shifts (which are no longer constrained to be real by unitarity) become complex. A scattering resonance develops with the onset of PT symmetry breaking in the bound states. The Kronig-Penney model of solid state physics is a one dimensional comb of delta functions. Here we consider a PT symmetric crystal formed by a periodic array of the PT symmetric delta function potentials. We find PT symmetry breaking and novel wave propagation phenomena in these simple models of PT symmetric crystals.

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