

\mathcal{PT} symmetric nonlinear systems and some of their implications in optics

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In this talk, I will discuss the dynamics and applications of certain novel mechanical and optical \mathcal{PT} symmetric systems. I will point out the existence of two-fold and many-fold \mathcal{PT} symmetric systems and explain the spontaneous symmetry breaking of each of the \mathcal{PT} symmetries. With a remarkable integrable model, the spontaneous symmetry breaking phenomenon will also be explained from exact solution point of view. Then, the occurrence of \mathcal{PT} symmetry breaking phenomenon will be demonstrated in the case of coupled waveguide systems. The observed symmetry broken states have possible applications in the construction of unidirectional optical devices like optical diodes. I will show the ability to achieve unidirectional light transport in loss-gain free systems and also the possibility to control blow-up responses in a nonlinear loss-gain system.

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