

General Coupled Mode Theory in Non-Hermitian Waveguide and Possible Applications

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In the presence of loss and gain, the coupled mode equation on describing the mode hybridization of various waveguides or cavities, or cavities coupled to waveguides becomes intrinsically non-Hermitian. In such non-Hermitian waveguides, the standard coupled mode theory fails. The speaker and his group generalize the coupled mode theory with a properly defined inner product based on reaction conservation. They apply their theory to the non-Hermitian parity-time symmetric waveguides, and obtain excellent agreement with results obtained by finite element full wave simulations. Such treatment can be used to other non-Hermitian problem, such as in chiral and bianisotropic medium.