

Complex Berry phase instability in PT-symmetric coupled waveguides

Rosie Hayward

School of Engineering and physical Sciences, Heriot-Watt University, Edinburgh, EH14 4AS, United Kingdom

We show that the analogue of the geometric phase for non-Hermitian coupled waveguides with PT-symmetry and at least one periodically varying parameter can be purely imaginary, and will consequently result in the manifestation of an instability in the system. The instability peaks seen in the spectrum of the system's eigenstates after evolution along the waveguides can be directly mapped to the spectrum of the derivative of the geometric function. The instabilities are magnified as the EP of the system is approached, and non-adiabatic effects begin to appear. As the system cannot evolve adiabatically in the vicinity of the exceptional point, PT-symmetry will be observed breaking earlier than theoretically predicted