ABSTRACT
I will give a brief account of some examples of non-Hermitian Hamiltonian systems with real spectra, which have appeared in the literature over the last four decades. I will discuss the spectral properties of these type of Hamiltonians and explain how their reality results from PT-symmetry, quasi-Hermiticity, pseudo-Hermiticity or supersymmetry. Subsequently I review the general technicalities needed to formulate a consistent quantum mechanical system in this context by constructing an appropriate metric and domain. I will provide some Lie algebraic examples.

Taking PT-symmetry as a guiding principle one may construct deformations of integrable models, such as Calogero-Moser-Sutherland models, the Korteweg-deVries or Burgers equation. It turns out that some of these deformations are supersymmetry preserving. Others even leave the integrability in tact and therefore lead to new types of integrable system.