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**Short title:** Non-Hermitian quantum mechanics of non-diagonalizable Hamiltonians: puzzles with self-orthogonal states.

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**Review text:**

Once you start feeling that self-orthogonality really is a puzzle in non-Hermitian quantum mechanics, you have to clarify it. This is the key purpose of this paper. A careful and sufficiently rigorous account and summary are presented of the related mathematics of linear differential operators, with particular attention paid to the completion of the set of eigenstates using associated functions. Particularly remarkable observations are made concerning some subtleties emerging for bound states embedded in the continuous part of the spectrum. A few nice illustrative examples are constructed within the framework of the so called supersymmetric quantum mechanics.