Diagonal ordering operation technique applied to Morse oscillator

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Abstract

We generalize the technique called as the integration within a normally ordered product (IWOP) of operators referring to the creation and annihilation operators of the harmonic oscillator coherent states to a new operatorial approach, i.e. the diagonal ordering operation technique (DOOT) about the calculations connected with the normally ordered product of generalized creation and annihilation operators that generate the generalized hypergeometric coherent states. We apply this technique to the coherent states of the Morse oscillator including the mixed (thermal) state case and get the well-known results achieved by other methods in the corresponding coherent state representation. Also, in the last section we construct the coherent states for the continuous dynamics of the Morse oscillator by using two new methods: the discrete–continuous limit, respectively by solving a finite difference equation. Finally, we construct the coherent states corresponding to the whole Morse spectrum (discrete plus continuous) and demonstrate their properties according the Klauder's prescriptions.

Keywords

- Normally ordered product;
- Morse oscillator;

- Coherent state;
- Mixed spectrum

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