

## Generalized Hyperbolic Functions: Exponential-Type Quantum Interactions

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**Abstract :** In the search of potential models applied in the theoretical treatment of diatomic molecules, some of them have been constructed by using standard hyperbolic functions as well as from the so-called  $q$ -deformed hyperbolic functions (sc  $q$ -dhf) for displacing and modifying the shape of the potential under study. In order to transcend the scope of hyperbolic functions, in this work, a kind of generalized  $q$ -deformed hyperbolic functions (g  $q$ -dhf) is presented. By a suitable transformation, through the  $q$  deformation parameter, it is shown that these g  $q$ -dhf can be expressed in terms of their corresponding standard ones besides they can be reduced to the sc  $q$ -dhf. As a useful application of the proposed approach, and considering a class of exactly solvable multi-parameter exponential-type potentials, some new  $q$ -deformed quantum interactions models that can be used as interesting alternative in quantum physics and quantum states are presented. Furthermore, due that quantum potential models are conditioned on the  $q$ -dependence of the parameters that characterize to the exponential-type potentials, it is shown that many specific cases of  $q$ -deformed potentials are obtained as particular cases from the proposal.

**Keywords :** diatomic molecules, exponential-type potentials, hyperbolic functions,  $q$ -deformed potentials

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