

## A New Kind of k-Quantum Nonlinear Coherent States: Their Generation and Physical Meaning

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Abstract: A new kind of k-quantum nonlinear coherent states, i.e., the k eigenstates of the k-th power  $\hat{B}^k$  ( $k \geq 3$ ) of the generalized annihilation operator  $\hat{B} = \hat{a} \frac{1}{f(\hat{N})}$  of f-oscillators, are obtained and their properties are discussed. The completeness of the k states is investigated. An alternative method to construct them is proposed. It is shown that these states may form a complete Hilbert space, and all of them can be generated by a linear superposition of k Roy-type nonlinear coherent states. Physically, they can be generated by a linear superposition of the time-dependent Roy-type nonlinear coherent states at different instants.

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