NEW MODELS OF A QUANTUM OSCILLATOR

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S u m m a r y

We construct new models of a quantum oscillator. As in the case of the Macfarlane–Biedenharn q-oscillator, these models are related to q-Hermite polynomials. The position and momentum operators in our models are appropriate representation operators for the quantum algebra $\mathrm{su}_q(1,1)$. As in the case of the standard harmonic oscillator in quantum mechanics, the position and momentum operators have continuous simple spectra. These spectra cover a finite interval on the real line which depends on a value of q. Eigenfunctions of these operators are explicitly found. Contrary to the case of the Macfarlane–Biedenharn q-oscillator, the position and momentum operators Q and P of our models satisfy the quantum mechanics relations $[H,Q] = -\mathrm{i}P$ and $[H,P] = \mathrm{i}Q$.