

Exact solutions of a particle in a box with a delta function potential: The factorization method

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We find the exact eigenvalues and eigenfunctions for the problem of a particle in a box with a delta function potential $V(x)=\lambda\delta(x-x_0)$ using the factorization method. We show that the presence of the delta function potential results in the discontinuity of the corresponding ladder operators. More importantly, the presence of the delta function potential allows us to obtain the full spectrum of the problem in the first step of the factorization procedure even for the weak coupling limit ($\lambda \rightarrow 0$).

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