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Review text:

In quantum mechanics the one-dimensional motion of a free particle may be modified by a suitable, phenomenologically motivated coordinate-dependence either in its effective mass (controlled by the medium and altering the kinetic-energy operator K) and/or in an external field [characterized by the potential-energy term $V = V(x)$]. The authors consider one of the simplest special choices of the corresponding generic Hamiltonian $H = K + V$ [cf. Eq. (1)]. They restrict their attention to the special model with a point interaction in the origin [cf. Eq. (2)] and with the most schematic step-shaped form of the mass $m = m(x)$ [cf. Eq. (4)]. Having accepted the two sample self-adjoint extensions of their Hamiltonian [based on the matching of wave functions, cf. sections 2 and 4, respectively] they finally discuss the existence [requiring, unfortunately, a correlation between $m(x)$ and $V(x)$] and the closed-form construction of the corresponding bound state.