

***The second derivative of a delta- function potential:
An exactly solvable model***

Sami M. aL-Jaber

Department of physics, An-Najah National University

Nablus, Palestine. E.Mail:jabber@najah.edu

Abstract: *We consider an exactly solvable model, namely the $u''(x)$ interaction that is one of the point interactions. For the repulsive case, we drive the reflection and transmission coefficients. It is shown that the coefficients satisfy the unitarity of the scattering matrix. If the incident particle has a certain energy, then the barrier becomes perfectly reflective. Furthermore, it is shown that the barrier becomes completely transmittive for the high-energy behavior. For the attractive case, we examine both the bound states and the scattering states. It is shown that there exist two bound states and for the scattering case it is demonstrated that one recovers the same reflection and transmission coefficients that were obtained for the repulsive case.*

Keywords: *Bound states, Scattering, Formalism.*