

J07Q.1 - Excitation from a Delta Function Potential

Problem

Consider a non-relativistic mass m particle with coordinate x in one dimension that is subject to an attractive delta-function potential at $x = 0$, *i.e.*, a potential $V(x) = -V_0\delta(x/a)$, with $V_0 > 0$.

- a) The ground state of the particle is a bound state. Find its wave function and binding energy.
- b) The particle is now perturbed by a weak time dependent potential $V(x,t) = Fx \cos(\omega t)$. Find the transition rate from the bound state to the continuum. (It may help to confine the particle in a large box $|x| < L/2$ and then take the limit $L \rightarrow \infty$.)