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Quantum Scattering Using the Finite Element Method[1] SEAN MCALINDEN, EVAN FARRELL, JANINE SHERTZER, College of the Holy Cross — The finite element method (FEM) is a numerical algorithm for solving second order partial differential equations. Our research involved using the FEM to solve the Schrodinger equation for quantum mechanical systems, including both bound states and scattering states. We first considered a beam of particles scattered by a rectangular potential barrier. We calculated the wave function, as well as the transmission and reflection coefficients as functions of the particle energy and barrier height. This problem is an important test case because it is one of the few scattering problems that can be solved exactly. In this poster, we compare our results to the exact solution. The advantage of the FEM is that one can obtain accurate numerical solutions for more complicated potentials, which cannot be solved analytically. We are currently extending this analysis to calculate the diffraction pattern for electrons passing through a single slit using a two-dimensional version of the FEM.

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