This project involves the scattering of incident pulses propagating in a medium having a wave speed \( c(x) \) with a simple smooth transition from a constant wave speed \( c_1 \) when \( x = -\infty \) to a constant wave speed \( c_2 \) when \( x = +\infty \). The problem involves studying the effects of the smoothness of the transition, the asymptotic ratio of wave speeds \( c_2 / c_1 \) and the shape of an incident pulse on the transmission and reflection properties of scattered waves. The method to be investigated is based on a superposition of special invariant solutions arising from nonlocal symmetries of such a variable wave speed wave equation.

Background required: At least 80% in senior level Honours Physics courses, high standing in Math 300, 316 and 400 plus a background in using symmetries to solve partial differential equations.