

SELF-ADJOINT POINT INTERACTION MODEL OF p -SCATTERING

P KURASOV

kurasov@maths.lth.se

Centre for Mathematical Sciences

Lund Institute of Technology

Lund University

Box 118

SE-221 00 Lund, Sweden

We are going to present an exactly solvable model of point interaction leading to non-trivial scattering amplitude in p -channel. This model is a generalization of the celebrated Berezin-Faddeev model which is used to describe the s -scattering. The operator under investigation is given by the formal expression

$$-\Delta + \alpha_x \partial_x \delta + \alpha_y \partial_y \delta + \alpha_z \partial_z \delta,$$

where $\alpha_{x,y,z}$ are arbitrary real constants and δ is Dirac's delta function. To determine this operator rigorously the theory of finite rank singular perturbations of self-adjoint operators is used. It is proven that this operator can be determined in a certain finite-dimensional extension of the Hilbert space $W_2^1(\mathbf{R}^3)$. Spectral and scattering properties of the described model are investigated. In the case $\alpha_x = \alpha_y = \alpha_z$ one gets a spherically symmetric model (the operator commutes with the rotations) with nontrivial p -component of the scattering amplitude. Possible generalizations to include higher order interactions are discussed.