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Matrix continued fractions for the Feshbach-Villars equations[1]
NATALIE BROWN, ZOLTAN PAPP, ROBERT WOODHOUSE, California State University of Long Beach — Relativistic spin-zero particles are mostly described by the Klein-Gordon equation. However, there exists an equivalent, little known, formulation, the Feshbach-Villars formalism. In the Feshbach-Villars formalism, the Klein-Gordon wave function is broken into two components such that the equations appear in a Hamiltonian form with first order time and second order spatial derivatives. The aim of this work is to develop a solution method for the Coulomb plus short-range potential problems. We write the Feshbach-Villars equations in a Lippmann-Schwinger form and we calculate the corresponding Coulomb-Green's operator in a Coulomb-Sturmian basis representation by a matrix continued fraction. We illustrate the efficiency of the method by calculating the eigenstates of an attractive Coulomb plus Yukawa potential.

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