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A practical method to solve the cut-off Coulomb problem in the Lippmann-Schwinger RGM formalism¹ Y. FUJIWARA, Kyoto University —

In the momentum representation, incorporating the long-range Coulomb force always poses problems. We propose a simple and accurate method to solve the Lippmann-Schwinger RGM (resonating-group method) equations, with the Coulomb force included at the constituent level. If the cut-off Coulomb force is used, the direct and exchange Coulomb kernels are explicitly evaluated with a reasonable size for the cut-off radius R , without spoiling the effect of the Pauli principle. The direct potential thus obtained becomes a screening Coulomb in the error function form. The cut-off is no longer sharp, but the standard procedure of the cut-off Coulomb problem, proposed by Vincent and Phatak [Phys. Rev. C10, 391 (1974)], can still be used by solving the asymptotic waves down to $R_{\text{in}} \ll R$, where the full Coulomb force is acting. We show two examples, $\alpha\alpha$ RGM and the charged cases of the quark-model baryon-baryon interactions fss2. In the latter case, accurate determination of the nuclear phase shifts is very important for evaluating the low-energy parameters, including the inelastic capture ratio at rest for Σ^-p scattering.

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Yoshikazu Fujiwara
Kyoto University

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