the trial wave function fulfill $(H-E)\Psi_t = 0$ in the interaction region. This condition can be achieved with a variety of methods.

In the present paper we have discussed two applications of the integral relations: the use of bound state like wave functions to describe scattering states and, in the case of charged particles, the possibility of computing phase-shifts using scattering wave functions with free asymptotic conditions, obtained after screening the Coulomb interaction. Both problems are of interest in the study of light nuclei. We started discussing the applications to the $A = 2$ system with a model (short-range) potential. In this system the solution of the Schrödinger equation is possible and, therefore, meaningful comparisons between the variational estimates of the phase-shifts and the exact values can be performed. In the analysis it was shown that after a diagonalization procedure of the two-nucleon Hamiltonian those eigenvectors corresponding to eigenvalues embedded in the continuum spectrum can be used as inputs in the integral relations to determine the phase-shifts at those energies. We have observed that increasing the number of basis states, the phase-shifts converge to the exact values. In the second application we have performed a scattering calculation adding to the short-range potential a screened Coulomb potential. Accordingly we have imposed free asymptotic conditions to the wave function. It is well known that increasing the screening radius, the phase-shift calculated with the screened potential will never match the phase-shift obtained considering the full Coulomb potential. A renormalization procedure is necessary (see Ref. [21] and references therein). It is very interesting to observe that the relation integrals as given in Eq. (33) produce the correct result. In fact, for suitable values of r_{sc} and n, the wave function calculated with the screened potential, $\Psi^{(n)}_{r_{sc}}$, is an approximate solution of $(H-E)\Psi^{(n)}_{r_{sc}} = 0$ in the region in which the short-range potential is active, with H containing the bare Coulomb interaction. In fact, due to the short-range character of the integral relations, it is equivalent to use $\Psi^{(n)}_{r_{sc}}$ or the wave function calculated with the Coulomb interaction in Eq. (33).

These examples have been discussed also in the three-nucleon system. As a reference, we have used the PHH method which gives a very accurate description of the $A = 3$ system and is well documented in the literature. Firstly, we have calculated bound state wave functions using a semi-realistic interaction. For fixed values of J^+ and T the Hamiltonian has been diagonalized and attention has been given to those eigenvalues satisfying $E_d < E < 0$. This energy region corresponds to $N-d$ elastic scattering and is located below the breakup into