Abstract:

We apply the recently developed theory of permutation-symmetric O(6) hyperspherical harmonics to the quantum-mechanical problem of three non-relativistic quarks confined by a spin-independent 3-quark potential. Previously derived group-theoretical results are used to reduce the three-body Schrödinger equation to a set of coupled ordinary differential equations in the hyper-radius $R$ with coupling coefficients expressed entirely in terms of (i) a few interaction-dependent O(6) expansion coefficients and (ii) O(6) hyperspherical harmonics matrix elements. This system of equations allows a solution to the eigenvalue problem with homogeneous 3-quark potentials, which class includes a number of standard Ansätze for the confining potentials, such as the Y- and Delta-string ones.