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A hyperspherical calculation method [1] and a variational method, based on the use of distributed Gaussian function (DGF) [2] and pair coordinates, are applied to the study of the argon trimer rovibrational spectrum. These calculations have been performed on a semiempirical pair potential by Aziz [3] and an ab initio three-body potential from reference [4]. The results are compared with those from reference [4] and Path Integral Monte Carlo predictions.

The DGF method is particularly simple to treat the vibration-rotation interaction. The total Hamiltonian (H_{tot}) is assumed to be the sum of two terms: an exact vibrational Hamiltonian (H_{vib}, J = 0) and a rigid rotor-like part (H_{rot}) to describe rotation. The diagonalization of H_{rot}, in a basis formed by eigenstates of H_{vib} (ν), the total angular momentum (J), its projections on the body-fixed (Ω) and space-fixed z-axis (M), allows us to obtain the rovibrational spectrum. This method is closely related to the van Vleck's approach [5] and to the rotation-vibration separation scheme by Jellinek and Li [6].