

Method of intermediate problems in the Fröhlich polaron model

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Method of intermediate problems in the theory of semi-bounded operators in rigged Hilbert space was applied to investigation of the ground state energy of the Fröhlich polaron model. It was shown that various infinite sequences of non-decreasing improvable lower bound estimates for the polaron ground state energy can be derived for arbitrary values of the electron-phonon interaction constant. The proposed approach allows for explicit numerical evaluation of the thus obtained lower bound estimates at all orders and can be straightforwardly generalized for investigation of the low-lying branch of the polaron excitation energy spectral curve adjacent to the ground state energy of the polaron at rest. In conjunction with numerous, already derived by multitudinous methods, well-known upper bound estimates for the energy spectral curve of the Fröhlich polaron as a function of the electron-phonon interaction constant and the polaron total momentum, the aforesaid improvable lower bound estimates may provide one with virtually precise magnitude for the energy of the slow-moving polaron.