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Metastable states of diatomic beryllium molecule

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Calculation of vibrational-rotational bound states and metastable states of a diatomic beryllium molecule important for laser spectroscopy [1] are presented. The solution to the problem is performed using the potential curve given in [2,3] and the authors' software package that implement the iteration Newton method and the high-accuracy finite element method [4]. The efficiency of the proposed approach is demonstrated by calculated for the vibrational-rotational bound states and the first time sharp metastable states with complex eigenenergies (with negative imaginary parts of order $10^{-20} \div 10^{-3}$ cm^{-1}) in a diatomic beryllium molecule.

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