Theoretical hot methane line lists up to 2000 K for astrophysical applications

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In this work, we report the complete construction of hot methane line lists based on *ab initio* surfaces [1,2] and extensive first-principles calculations [3,4]. Four line lists spanning the [0 - 5000] cm^{-1} infrared region have been built at T =500, 1000, 1500 and 2000 K and will be available soon [5]. For each line list, the lower state energies have been systematically taken into account up to 13000 cm^{-1} and the contributions of the cold and hot bands have been described in details. Comparisons with existing line lists [6,7] show good agreements. Our line lists will be very useful to model astrophysical objects for various high-temperature applications (brown dwarfs, exoplanets) [8].

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