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Time of weak lines and poor parameters

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A lot of high quality information, both experimental and theoretical, about spectra of molecular gases has been obtained in the last time for the purpose of atmospheric and astronomic applications. For example, very detailed linelists were calculated for: water vapor $H_2{}^{16}O$ - BT2 (Barber-Tennyson containing about 500,000,000 transitions), $HD^{16}O$–VTT (Voronin, Tennyson, Tolchenov~700,000,000 transitions), some other gases–NH_3 Byte (~1.1 billion transitions), SO_2 (4,000,000), CH_4 (~1 billion transitions). All these line lists involve huge number of strong and weak lines, which possess accurate line position and strength. But other spectroscopic parameters, such as air-broadening, self-broadening, temperature exponents are absent. So, there is a need to determine these parameters for different applications. This present work is aimed at developing of simple methods of estimation of needed line parameters for $HD^{16}O$. Also similar data will be presented for $H_2{}^{16}O$, NH_3, CO, SO_2.

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Results of computer simulating the lunar physical liberation for lunar polar telescope

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The study of lunar rotation (physical libration) gives reach information about the lunar interior because of this the space experiments to pose on the lunar polar zone a small optical telescope are planned in Russia and in Japan. The purpose of the experiment was to detect the lunar physical liberation with millisecond accuracy. Computer simulation of these future observations is being done with the purpose of optimizing the observations of effective placement of measuring system on the lunar surface and testing of sensitivity of new observations to various features of the lunar interior structure. The software for the selection of stars and reduction of their coordination onto the period of observations was developed at the simulation, the tracks for the selected stars are constructed and analyzed and their sensitivity to the internal characteristics of the lunar body, in the first place, to the seleno-potential coefficients, was tested. Inverse problem of lunar physical liberation was formulated and solved. It was shown that seleno-graphic coordinates of polar stars were insensitive to longitudinal liberations $\tau(t)$. Comparing coordinates calculated for two models were a rigid and deformable moon which is carried out and the components sensitive to love number K2 were revealed. Analytical theory of physical liberation was a very convenient tool for modeling the upcoming observations.

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