ANALYSIS OF THE LINE POSITIONS AND LINE INTENSITIES IN THE ν_2 BAND OF THE WATER MOLECULE

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The somewhat successful treatment developed to account for the anomalous centrifugal distortion displayed by the water molecule[a] has been slightly altered in order to permit a calculation of the rotational energy in the ground and in the $v_2 = 1$ vibrational states using the *same* set of spectroscopic constants. This new treatment has been used to carry out two analyses of large bodies of data relevant to the water molecule. In the first analysis, in addition to the rotational levels of the ground[b] and $v_2 = 1$[c] vibrational states, infrared and microwave transitions within the ground and the $v_2 = 1$ vibrational states as well as infrared transitions belonging to the ν_2 band[d] were considered. The unitless standard deviation of this first analysis is 1.4, the maximum J- and K_a-values considered being 25 and 20, respectively, and 71 spectroscopic constants were used. In the second analysis, the intensities published by Toth[d] were included in a least squares fit procedure in which line-strengths were evaluated choosing a physically reasonable dipole moment function and computing its matrix elements with the spectroscopic constants of the first analysis.
In the paper, the results obtained in the two analyses will be presented. The potential energy and dipole moment functions derived from the analyses will be discussed. The latter function will be compared to that obtained by other authors[e].

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