ANALYSIS OF NEW DATA SETS PERTAINING TO THE WATER MOLECULE

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Although water is just a simple triatomic molecule, its spectroscopy still remains a challenge due to the ever increasing amount of available data. Two types of data have been recently obtained for water:

- Accurate frequencies have been measured for transitions in the sub millimeter and terahertz domains involving high-lying rovibrational levels up to the first triad. 149 transitions have been measured between 300 GHz and 2 THz and 26 from 2.5 to 2.7 THz. These *b*-type transitions take place within one of the five first vibrational states.
- Far infrared transitions involving high-lying rovibrational levels have been recorded recently in the 50 to 600 cm^{-1} region using the emission spectrum of a continuous flow of water vapor rovibrationaly excited by an electrodless radio-frequency discharge.[a] 3793 transitions with $\Delta K_a = 1$ within one of the five first vibrational states of the molecule have been assigned so far and involve J-values up to 25 and K_a-values up to 15. There remains a large number of unassigned transitions involving either higher lying vibrational states, larger values of ΔK_a, or taking place between different vibrational states.

The paper will focus on the results of the analysis of a large data set consisting of already published data[b] and of the two new data sets. The number of data is equal to 20491 and the bending-rotation theoretical approach[c] will be used for the energy level calculation.

[a] Pirali and Vervloet, *Chem. Phys. Letters* **423** (2006) 376.
[b] Coudert, Wagner, Birk, Baranov, Lafferty, and Flaud, *J. Molec. Spec.* **251** (2008) 339.
[c] Coudert, *J. Molec. Spec.* **181** (1997) 246.