MICROWAVE SPECTROSCOPY: LINESHAPE APPROXIMATION FOR SQUARE-WAVE FREQUENCY MODULATION

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To improve sensitivity of absorption spectrometers a source modulation with lock-in detection is usually employed. In the Kharkiv millimeter wave spectrometer we employ DDS based square-wave frequency modulation which is characterized by a high certainty of modulation parameters. Commonly applied approaches developed for a sine-wave frequency modulation (see for example [1]) are not able to fully account for all lineshape modifications due to the square-wave frequency modulation. That is why we have developed a new expression which allows us to take into account lineshape modification due to square-wave frequency modulation as well as well-known problem of lineshape distortions caused by presence of standing wave in an absorbing cell. Our approach reproduce well observed line profiles and as the result provides some improvement of measurement accuracy. In the talk the details of the new approach will be discussed.

[1] L. Dore, J. Mol. Spectrosc. 221, pp.93-98, 2003.

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