A SIMPLE AND FAST SPEED-DEPENDENT LINE SHAPE MODEL

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With increasing resolution and signal to noise, high resolution spectroscopy studies have found it necessary to use increasingly accurate line shape models to explain the observed spectral profiles. Beyond the Lorentz and Voigt profiles, the hard and soft collision models include Dicke narrowing effects. However, another effect of significance, commonly referred to as speed-dependence, has now been observed by several groups. Work on speed-dependent profiles continues, but common to all models is a trend towards increasing complexity. We present an empirical line shape modification to include speed dependent effects, that is sufficient to fit experimental spectra with a frequency resolution of 2 MHz and a signal to noise ratio of 3000:1. This model requires little extra computation and no additional line parameters. The line shape may be of use in practical applications where a fast and accurate line shape is required or when accurate line shape parameters are being determined from the spectra.

We present results of this model applied to the fundamental band of CO and will discuss the problems encountered when other models are used.