GENERATING COMPLETE SETS OF BEYOND-VOIGT LINE-SHAPE PARAMETERS FOR THE HITRAN DATABASE: DATASET STRUCTURE, TEMPERATURE-DEPENDENCIES, LINE-SHAPE MODEL

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The accurate characterization of collision-perturbed spectral lines from many molecular systems requires a profound understanding of the beyond-Voigt effects that influence the spectrum [1]. These effects are described by eight essential spectral line-shape parameters: pressure broadening and shift (γ_0 and δ_0), their speed dependencies (γ_2 and δ_2), the real and imaginary parts of the complex Dicke parameter ($\tilde{\nu}^r_{opt}$ and $\tilde{\nu}^i_{opt}$) and the complex line-mixing coefficient (y^r and y^i). Accurate knowledge of the temperature dependencies of these parameters is crucial for spectroscopic investigations of terrestrial [2] and extraterrestrial [3] atmospheres.

In my presentation, I will focus on the methodology employed to establish an extensive dataset of beyond-Voigt spectral line-shape parameters [4]. I will discuss interpolation and extrapolation schemes of the *ab initio* data to provide entries for the entire datasets in the HITRAN database [5]. I will introduce the double-power-law (DPL) temperature-dependence model [6], which offers a universal, straightforward, and accurate structure for each of the six line-shape parameters. I will discuss a new beyond-Voigt line-shape profile recommended for the HITRAN database.

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