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Combined effect of small- and large-angle scattering collisions on a spectral line shape

Victor P. Kochanov

Laboratory of Theoretical Spectroscopy, V.E. Zuev Institute of Atmospheric Optics SB RAS
1, Akademician Zuev Sq., Tomsk, 634055 Russia

Physical Department of Tomsk State University
36, Lenin Ave., Tomsk, 634050 Russia

E-mail: koch@iao.ru

Algebraic approximations for line profiles calculated on the basis of quantum-mechanical collision integral kernels for dipole-dipole, dipole-quadrupole, and quadrupole-quadrupole intermolecular interaction potentials were obtained. In derivation of the profiles velocity-changing collisions of molecules with scattering on small and large angles also with the speed-dependence of collision relaxation constants have been taken into account following the detailed scheme of calculations presented in Ref. [1]. It was shown on the basis of numerical calculations that the relative contribution of small-angle collisions into the frequency of elastic velocity-changing collisions is more pronounced for the long-range dipole-dipole and dipole-quadrupole potentials. A sensitive criterion for analysis of a line narrowing was proposed and tested.

References

1. V.P. Kochanov, *JETP* **118**, 335–350 (2014) [*Zh. Eksp. Teor. Fiz.* **145**, 387–404 (2014)].