Applications of SPFIT to fitting the spectra of diatomic molecules will be demonstrated. Examples will include: fitting of multiple isotopomers and vibronic levels with mass-independent Dunham parameters including Born-Oppenheimer corrections; fitting transitions between states of different multiplicity; simultaneous fitting of data from microwave, infrared and optical experiments weighted by appropriate experimental uncertainties; and simultaneous fitting of data sets containing both resolved and unresolved hyperfine structure.

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