An update on MCC calculations: molecular hydrogen, its isotopologues and beyond

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Molecular hydrogen and its isotopologues are present in a range of vibrationally excited states in fusion, atmospheric, and interstellar plasmas. Electron-impact excitation cross sections resolved in both the target's final and initial vibrational levels are required for modeling the properties and dynamics and controlling the conditions of many low-temperature plasmas. The molecular convergent close-coupling (MCCC) method has been utilised to provide a comprehensive set of accurate excitation, ionization, and grand total cross sections for electrons scattering on H_2 in the ground electronic state resolved in all initial and final vibrational levels. This dataset is currently being extended to scattering from electronically excited states and obtaining rotationally resolved cross sections. In this talk, I will review the available e-H_2 collision data and discuss their application to modeling electron impact dissociative processes for molecular hydrogen and its isotopologues. Planned application of the MCCC method to more complex molecules will be discussed.