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**Inference of degree of dissociation for weakly collisional DC hydrogen plasmas with collisional-radiative models<sup>1</sup>** BIN AHN, YEGEON LIM, YOUNGCHUL GHIM, Korea Advanced Institute of Science and Technology — An analysis technique to infer a degree of dissociation(DOD) of weakly collisional DC hydrogen plasmas is developed and examined with an experiment. The collisional-radiative models for hydrogen atom and molecule are newly constructed and modified so that they can handle bi-Maxwellian electron energy distribution and radiation trapping effect, plus the Fulcher-alpha transition analysis for gas temperature and ground vibrational temperature from ro-vibrational distribution of excited molecules. Multiple steps are involved to produce calculated state distributions with experimentally measured parameters, and they are compared with measured spectra to infer the most reasonable DOD. To examine and verify the analysis technique, hydrogen plasmas are generated in a large cylindrical chamber, MAXIMUS, with a W filament cathode, and the gas pressure is scanned from 3 to 6mTorr. Various diagnostics including the optical absorption & emission spectroscopy and the Langmuir probe measurement are used to obtain spectra and electron parameters. With the analysis technique, the DODs for the generated plasmas are inferred to be around 1%, and increase with the gas pressure.

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