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Resonant Dissociative Recombination

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In the collision of electrons with molecules and molecular ions, excitation and dissociation are dominated by resonant processes, where the electron becomes temporarily trapped, changing the forces felt by the nuclei. We will outline our method for treating these collision processes, where one or more resonant states exist. We separate the problem into two steps. First, the resonance parameters are obtained from accurate electron scattering calculations using the Complex Kohn variational method. Then these parameters are used as input to the dynamics calculations. We will illustrate the method with the study of dissociative recombination for the He_2^+ , Ne_2^+ , and Ar_2^+ molecular ions following collision with low energy electrons. Dissociative recombination of the rare gases are important processes in the ionosphere as well as laboratory plasmas and gaseous discharges. Comparison will be made to the available cross sections and rate coefficients. In collaboration with V. Ngassam and J. Royal. Work supported by the NSF PHY-02-44911, The Center for Biophotonics, an NSF Science and Technology Center PHY 0120999. and the NATO Science Program PST.GLG.9794033