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Distribution Function Shape Relaxation in Electron Atom Systems; the Kullback-Leibler Entropy BERNIE SHIZGAL, REINEL SOSPEDRA-ALFONSO, University of British Columbia — The relaxation of energetic electrons in an equilibrium background gas is an important fundamental problem in kinetic theory with important applications to devices in plasma processing of materials, plasma displays and other technologies. The objective is to study the electron-atom relaxation process in terms of the evolution of the shape of the distribution function (DF) and the relaxation time for the approach of the DF to equilibrium. We consider two rare gas atom moderators, Argon and Neon, characterized by different electron-atom momentum transfer cross sections. The isotropic portion of the DF is given by the Fokker-Planck equation. A measure of the departure of the DF from the steady state distribution is the Kullback-Leibler entropy (KLE). The relaxation time for the KLE is compared to the relaxation time for the electron temperature. The results presented include the heating of the electrons by an external electric field and the relaxation of the initial DF to the steady Davydov DF. The multi-exponential decay in these systems is interpreted approximately in terms of a single relaxation time for both the DF and the average energy.

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