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Effect of Electron Energy Distribution Function on Global Model for High Power Microwave Breakdown at High Pressure[1] SANG KI NAM, JOHN VERBONCOEUR, University of California Berkeley — The effect of a wide spectrum of reaction kinetics is very important in high power microwave (HPM) breakdown in molecular gases. However, it is not practical to investigate breakdown including detailed reaction kinetics using particle simulation due to the computational expense. Therefore, a fast volume-averaged global model was developed for the purpose of investigating the effect of reaction kinetics and plasma parameters for multiple species needed to model molecular gases. Since the global model is a fluid-based model, it requires specification of the electron energy distribution function (EEDF). Most global models assume a Maxwellian distribution for the EEDF. The electrons, however, are not in equilibrium unless the electron-electron collision is dominant. The assumption of a Maxwellian EEDF produces inaccurate reaction rate coefficients for the plasma discharge and results in incorrect plasma parameters especially at high pressure. We examine the effect of the EEDF on the global model and develop a method to find the proper approximation of the EEDF to improve fidelity of the prediction of the HPM breakdown at high pressure.

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