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A new approach for the determination of electron transport coefficients[1] MARKUS M. BECKER, DETLEF LOFFHAGEN, INP Greifswald, Felix-Hausdorff-Str. 2, 17489 Greifswald, Germany — Hydrodynamic models are commonly used for the theoretical description of gas discharge plasmas at moderate and high pressure. The full set of hydrodynamic equations is frequently simplified by means of the drift-diffusion approximation for electron particle and energy densities. Their diffusion coefficients and mobilities are usually determined from the solution of the zero-dimensional Boltzmann equation using expansion techniques and are finally incorporated into the fluid model as functions of the mean electron energy. The present contribution points out that common approaches are subject to serious restrictions regarding the description of nonlocal phenomena. A new drift-diffusion model for the treatment of the electron transport is suggested which avoids some of the drawbacks of the classical approaches. In particular, it is shown that the new model provides a better approximation of the electron heat flux, which is known to be crucial for an accurate description of the electron component in non-thermal discharge plasmas. To demonstrate its applicability, results for spatially one dimensional argon glow discharge plasmas at low and atmospheric pressure are presented and discussed.

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