Plasma-Sheath Transition: Electron Rich Sheath KLAUS WIESE-
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lisonfree sheath charged particle trajectories can be described as those of single par-
ticles falling freely under the influence of an external electric potential. In plasma
field- driven motion is drift – as long as friction by electron-ion collisions balances
the field force $e\underline{E}$. It depends only on local quantities. The transition from field
driven electronic drift to free fall resembles run-away and we treat it analogously
by a fluid model for a stationary inhomogeneous plasma region in front of a (plane)
electrode at positive potential. Ions are described by Boltzmann equilibrium, elec-
trons as drifting Maxwellian (similarly to H. Dreicer, Phys. Rev. **115** (1959) 238).
We present numerical solutions of the fluid equation together with the resp. Poisson
equation for initial plasma densities of 10^{10} and 10^{11}cm^{-3} at kT_e=1eV and 10eV.
Initial condition is set by an initial electron drift v_D. Solutions exhibit quasineutral
plasma followed by a sheath – the extension of plasma depending strongly on the
initial condition. For v_D= 0.5*10^{-3}*$< v_e >$ for example, we obtain quasineutral
plasma with decaying density over several thousand Debye-lengths.

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