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Carrier transport in nanodevices : a competitive playground for the Boltzmann and the Wigner distribution functions? FONS BROSENS, Universiteit Antwerpen, WIM MAGNUS, Interuniversity Microelectronics Centre (IMEC) — In principle, transport of charged carriers in nanometer sized solid-state devices can be fully characterized once the non- equilibrium distribution function describing the carrier ensemble is known. In this light, we have revisited the Boltzmann and the Wigner distribution functions and the framework in which they emerge from the classical respectively quantum mechanical Liouville equation. We have assessed the method of the characteristic curves as a potential workhorse to solve the time dependent Boltzmann equation for carriers propagating through spatially non-uniform systems, such as nanodevices. In order to validate the proposed solution strategy, we numerically solve the Boltzmann equation for a one- dimensional conductor mimicking the basic features of a biased low-dimensional transistor operating in the on-state. Finally, we propose a computational scheme capable of extending the benefits of the above mentioned solution strategy when it comes to solve the Wigner-Liouville equation.

Fons Brosens
Universiteit Antwerpen

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