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A Boltzmann Transport Simulation Using Open Source Physics JAVIER HASBUN, State University of West Georgia — The speed of a charged particle, under an applied electric field, in a conducting media, is, usually, simply modelled by writing Newton's 2nd law in the form $m\frac{d}{dt}v = qE - m\frac{v}{\tau}$; (1), where v is the speed, E is the applied electric field, q is the charge, m is the mass, and τ is the scattering time between collisions. Here, we simulate a numerical solution of the Boltzmann transport equation, $\frac{\partial}{\partial t}f + v \cdot \nabla_r f + F \cdot \nabla_p f = \frac{\partial}{\partial t}f|_{coll}$ (2), where in general the Boltzmann distribution function $f = f(r, p, t)$ depends on position, momentum, and time. Our numerical solution is made possible by neglecting the 2nd term on the LHS, and by modelling the RHS collision term as $\frac{\partial}{\partial t}f|_{coll} = -\frac{1}{\tau}$. With these approximations, in addition to considering only one dimension, we find, our numerical solution of (2). The average velocity numerically obtained through the resulting distribution is compared to that obtained by the analytic solution of (1). An efficient method of carrying out the numerical solution of (2) due to P. Drallos and M. Wadehra [Journal of Applied Physics 63, 5601(1988)] is incorporated here. A final version of an applet that performs the full Java simulation will be located at http://www.westga.edu/ jhasbun/osp/osp.htm.

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[X] Prefer Oral Session
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