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A sheath model for arbitrary radiofrequency waveforms M.M. TURNER, Dublin City University, PASCAL CHABERT, LPP, CNRS-Ecole Polytechnique — The sheath is often the most important region of a rf plasma, because discharge impedance, power absorption and ion acceleration are critically affected by the behaviour of the sheath. Consequently, models of the sheath are central to any understanding of the physics of rf plasmas. Lieberman has supplied an analytical model for a radio-frequency sheath driven by a single frequency, but in recent years interest has been increasing in radio-frequency discharges excited by increasingly complex wave forms. There has been limited success in generalizing the Lieberman model in this direction, because of mathematical complexities. So there is essentially no sheath model available to describe many modern experiments. In this paper we present a new analytical sheath model, based on a simpler mathematical framework than that of Lieberman. For the single frequency case, this model yields scaling laws that are identical in form to those of Lieberman, differing only by numerical coefficients close to one. However, the new model may be straightforwardly solved for arbitrary current waveforms, and may be used to derive scaling laws for such complex waveforms. In this paper, we will describe the model and present some illustrative examples.

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