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Electron power absorption through the sheath heating in low pressure microwave surface wave discharges[1] DENIS EREMIN, Ruhr University Bochum — Plasma discharges driven by surface waves in the microwave range of frequencies, capable of attaining overcritical plasma densities, have a large number of applications in plasma aided technologies. The electron power absorption mechanism bears great significance since it affects the plasma generation efficiency. It is commonly assumed that the dominant electron energization mechanism in such discharges operated at relatively low neutral gas pressures is the so-called "plasma resonance", which occurs at the location where the plasma frequency matches the driving frequency and where the electric field is expected to increase dramatically, leading to electron acceleration in the direction of decreasing plasma density. However, by modeling an example of such a discharge based on the plasma-line setup with the implicit energy-conserving electromagnetic 2d3v PIC/MCC code ECOPIC2M, the dominant electron heating mechanism is shown to be similar to the sheath heating mechanism observed in rf-driven discharges, where moving sheath "pushes" electrons during the sheath expansion. The direction of electron acceleration, predicted by such a mechanism and observed in the PIC simulations, is toward the bulk plasma, in contrast to the direction anticipated from the plasma resonance.

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