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Nonlocal effects in electron heating in atmospheric pressure capacitively coupled discharges DENIS EREMIN, TORBEN HEMKE, THOMAS MUSSENBROCK, Ruhr Universität Bochum — The present work discusses different aspects contributing to the excitation (ionization) pattern formation in highly collisional capacitively coupled discharges operated under atmospheric pressure in the Ω mode by using analytical arguments and results of numerical simulations. Whereas it is common to explain an observed excitation pattern by using the corresponding power absorption profile, it is argued that the two are essentially different, the former possessing an exponential dependence on the electric field in contrast to the latter. Therefore, the peaks in the profiles of the excitation rate and the absorbed power can take place at different spatial locations. A novel effect, previously unreported for the high pressure discharges, is observed, where spatial location of the peak in the excitation profile is shifted by a distance approximately equal to the energy relaxation length from the peaks in the absorbed power and the electric field profiles. This intrinsically nonlocal and kinetic (the energy relaxation length being much larger for the high energy compared to the low energy electrons) effect is particularly pronounced when the electric field is strongly nonuniform with the scale comparable to the energy relaxation length.

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