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Uphill acceleration in a spatially modulated electrostatic field particle accelerator FELIPE RUSSMAN, Universidade Federal do Rio Grande do Sul, IVANESSA ALMANSA, UFRGS, SAMUEL MARINI, Universit Paris-Saclay, EDUARDO PETER, UFRGS, GLAUCIUS OLIVEIRA, UFMS, ALAN CAIRNS, University of St Andrews, DAVID BURTON, Lancaster University, FELIPE RIZZATO, UFRGS — Spatially modulated electrostatic fields can be designed to efficiently accelerate particles by exploring the relations between the amplitude, the phase velocity, the shape of the potential and the initial velocity of the particle. The acceleration process occurs when the value of the velocity excursions of the particle surpass the phase velocity of the carrier, as a resonant mechanism. The ponderomotive approximation based on the Lagrangian average is usually applied in this kind of system. The mean dynamics of the particle is well described by this approximation far from resonance. However, the approximation fails to predict some interesting features of the model near resonance, such as the uphill acceleration phenomenon. Canonical perturbation theory is more accurate in these conditions and may be applied in different systems. We compare the results from the Lagrangian average and from canonical perturbation theory, focusing in regions where these two approaches differ from each other.

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