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Mode analysis for a microwave driven plasma discharge: A comparison between analytical and numerical results[1] DANIEL SZEREMLEY, THOMAS MUSSENBROCK, RALF PETER BRINKMANN, MARC ZIMMERMANNS, ILONA ROLFES, DENIS EREMIN, None, RUHR- UNIVERSITY BOCHUM, THEORETICAL ELECTRICAL ENGINEERING TEAM, RUHR-UNIVERSITY BOCHUM, INSTITUTE OF MICROWAVE SYSTEMS TEAM — The market shows in recent years a growing demand for bottles made of polyethylene terephthalate (PET). Therefore, fast and efficient sterilization processes as well as barrier coatings to decrease gas permeation are required. A specialized microwave plasma source – referred to as the plasmaline – has been developed to allow for depositing thin films of e.g. silicon oxid on the inner surface of such PET bottles. The plasmaline is a coaxial waveguide combined with a gas-inlet which is inserted into the empty bottle and initiates a reactive plasma. To optimize and control the different surface processes, it is essential to fully understand the microwave power coupling to the plasma and the related heating of electrons inside the bottle and thus the electromagnetic wave propagation along the plasmaline. In this contribution, we present a detailed dispersion analysis based on a numerical approach. We study how modes of guided waves are propagating under different conditions, if at all.

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