

Abstract Submitted
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Design of an HHFW antenna including high impedance surfaces for FTU DANIELE MILANESIO, RICCARDO MAGGIORA, Politecnico di Torino, Italy — The successful design of an Ion Cyclotron antenna mainly relies on the capability of coupling high power to the plasma (MW), feature that is currently reached by allowing rather high voltages (tens of kV) on the unavoidable unmatched part of the feeding lines. This requirement is often responsible of arcs along the transmission lines and other unwanted phenomena that considerably limit the usage of IC launchers. In this work, we suggest and describe a revolutionary approach based on high impedance surfaces, which allows to increase the antenna radiation efficiency and, hence, to highly reduce the imposed voltages to couple the same level of power to the plasma. High-impedance surfaces are periodic metallic structures (patches) displaced usually on top of a dielectric substrate and grounded by means of vertical posts usually embedded inside the dielectric, in a mushroom-like shape. In terms of working properties, high impedance surfaces are electrically thin in-phase reflectors, i.e. they present a high impedance, within a given frequency band, such that the image currents are in-phase with the currents of the antenna itself, thus determining a significant efficiency increase. This work documents the design by means of numerical codes of an antenna including high impedance surfaces to be tested on the FTU IBW port and fed by the FTU IBW generators at 433 MHz. The test on FTU, if successful, will confirm the possibility to adopt this approach for future HHFW antennas.

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