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High power electromagnetic filtering with plasma generation in rectangular Fabry-Perot type cut-resonators KONSTANTINOS KOURTZANIDIS, LAXMINARAYAN RAJA, The University of Texas at Austin — Microwave breakdown between all-dielectric resonators has been recently proposed as an efficient way of generating small scale plasmas. At resonant frequencies, electromagnetic fields radiate in the gap between two resonators leading to local field enhancement and plasma formation. We study numerically with a high fidelity electromagnetic-plasma solver, the possibility of efficient high power filtering using arrays of all-dielectric cut-resonators. We characterize the transient plasma formation as well as its steady state under various configurations and input parameters. We demonstrate that using rectangular all-dielectric Fabry-Perot type cut-resonators, full transmittance at resonant frequencies is being canceled when the incident wave power leads to local breakdown. The plasma discharge is formed at the antinodes locations of the standing wave pattern radiating between the arrays of resonators and its spatial extend, maximum electron density and localization depends on the gap size, the operating frequency, the input power as well as the background gas pressure. The application of this power filtering concept to a waveguide structure is also studied, showing that the proposed idea can be used in realistic transmission line configurations.

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