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Locally-enhanced generation of plasma by magnetic resonance of double-split-ring resonators AKINORI IWAI, YOSHIHIRO NAKAMURA, Kyoto University, YUKI KABE, OSAMU SAKAI, The University of Shiga Prefecture, THE UNIVERSITY OF SHIGA PREFECTURE COLLABORATION, KYOTO UNIVERSITY COLLABORATION — We performed experiments of plasma discharge with a set of double-split-ring resonators (DSRRs) in the rectangular waveguide for 2.45-GHz waves, where their magnetic resonance takes place around the microwave frequency. When high-power waves enter plasmas, inherent nonlinearity of plasma clearly emerges. Electron density directly affects the intensity of a nonlinear current. Our group has studied low-pressure plasma excited by microwaves combined with DSRRs, and proposed a scheme of efficient penetration of high-power microwaves into overdense plasmas by negative-refractive index because DSRRs show negative permeability based on the magnetic resonance. We experimentally observed strongly-enhanced second-harmonic waves with DSRRs [1] and explained this nonlinearity is induced the local connection between plasma and DSRRs [2]. In this report, we show a further expanded phenomenon based on the magnetic resonance associated with this nonlinearity, i.e., the non-uniform generation of plasma around DSRRs and clarify this non-uniform profile, with locally-enhanced electron energy and density, is caused by the resonance. [1] A. Iwai, Y. Nakamura and O. Sakai, Phys. Rev. E, 92 (2015) 033105. [2] A. Iwai, Y. Nakamura, A. Bambina, and O. Sakai, Appl. Phys. Express, 8 (2015) 056201.

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