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**Enhancing harmonic generation using nonlinear Metamaterials**

SINHARA SILVA, University of South Florida, Tampa, KIM SONJU, California State University, San Bernardino, JIANGFENG ZHOU, University of South Florida, Tampa — In this work, we demonstrate the double-resonator meta-atom design in a nonlinear metamaterial can significantly enhance harmonics in microwave frequency regime. Nonlinearity in the structure is introduced by adding a varactor diode in the common slit of the double split ring resonator (DSRR) design. By engineering the structure such that inner ring resonance frequency of the DSRR is twice as the outer ring resonance frequency, we have demonstrated that the second harmonic of the outer ring can be enhanced by factor of 70 compared to a conventional SRR structure. Furthermore, the second harmonic of the periodic arrays can be further improved by carefully positioning the unit cells. In addition, with the enhancement of the second harmonic, other higher order harmonics can be enhanced.

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