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Resonance of metallic wire structures LEI ZHOU, Y. ZHANG, Fudan University, SIU TAT CHUI, University of Delaware — Metallic wire structures form a common class of physical systems. We illustrate how to understand the general physics of the wire systems with a specific example, the split ring resonantor. We derived simple polynomial equations to determine the entire resonance spectra of split ring structures, which can be analytically solved in the limit of narrow wires. A resonance spectrum very similar to that of a straight wire is obtained. For double stacking split rings made with flat wires, we showed that the resonance frequency depends linearly on the ring-ring separation. In particular, we found that the wavelength of lowest resonance mode can be made as large as 10^5 the geometrical size of the ring for realistic experimental conditions, whereas for current systems this ratio is of the order of 10. Finite-difference-time-domain simulations on realistic structures verified the analytic predictions.

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