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FDTD modeling of the optical fields produced by nanoarrays of coaxial structures on gold films MICHAEL HAFTEL, Naval Research Laboratory, CARL SCHLOCKERMANN, GIRSH BLUMBERG, Bell Laboratories, Lucent Technologies — Extraordinary optical transmission has been observed for nanoarrays of apertures in thin metallic films, originally attributed to coupling with surface plasmons (SP) [1]. More recently Baida et al. [2] have suggested that even larger enhancements can occur with nanoarrays of subwavelength coaxial structures at wavelengths much longer than those of the SP resonances. We employ the NRL HASP (FDTD) code to simulate the electromagnetic fields, in the 500-1500 nm wavelength range, produced by nanoarrays of silica coaxial cylinders (or rings) embedded in a thin gold film. We analyze the transmission spectrum as a function of ring geometry, film thickness, and periodicity. We contrast the results obtained from isolated rings and cylinders with those from arrays to assess the roles of SP and the resonances of the isolated structures in accounting for any field enhancements. We discuss the mechanisms of the field propagation in the real metal (versus an ideal metal) that may account for enhancements. [1] T. Ebbesen, H. Lezec, H. Ghaemi, T. Thio, and P. Wolff, Nature **391**, 667 (1998). [2] F. I. Baida and D. Van Labeke, Phys. Rev. B **67**, 155314 (2003).

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