Scattering electromagnetic wave by structure of dielectric ring resonators

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In this paper, we numerically studied the scattering of plane electromagnetic waves on dielectric rings structures with high dielectric permittivity = 150 and loss tangent = 0.001. Rings are made from high dielectric ceramic and have sizes $R = 8$ mm, $r = 5$ mm, $h = 3$ mm. The scattering properties are explained by the multipole expansion method. There is a strong resonance at 2.47 GHz, which is caused by pure magnetic dipole (MD). The structure of these rings can be used for controlling the scattered field, which is an important property for devices such as a controlled filter in a waveguide, a signal switch. Developing the above devices is difficult using one ring, that is why 1D and 2D dimenshional array structures are needed. In a simple case it is possible to control S11 and S12 parameters, power of the scattered field and it's radiation pattern just by rotating one ring relative to another and changing distance between them.