

## Transmission Line Matrix (TLM) Modelling of Microstrip Circular Antenna

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**Abstract :** The goal of this paper is to investigate the possibilities and effectiveness of the TLM (Transmission Line Matrix) method for modelling of up-to-date microstrip antennas with circular geometry that have significant application in modern wireless communication systems. The coaxially fed microstrip antenna configurations with circular patch are analyzed by using the in-house 3DTLMcyl\_cw solver based on computational electromagnetic TLM method adapted to the cylindrical grid and enhanced with the compact wire model. Opposed to the widely used rectangular TLM mesh, where a staircase approximation has to be used to describe curved boundaries, precise modelling of circular boundaries can be accomplished in the cylindrical grid irrespective of the mesh resolution. Using the compact wire model incorporated in cylindrical mesh, it is possible to model coaxial feed and include the influence of the real excitation in the antenna model. The conventional and inverted configuration of a coaxially fed circular patch antenna are considered, comparing the resonances obtained using TLM cylindrical model with results reached by the corresponding model in a rectangular grid as well as with experimental ones. Bearing in mind that accuracy of simulated results depends on a relevantly created model, besides structure geometry and dimensions, it is important to consider additional modelling issues, regarding appropriate mesh resolution and a relevant extension of a mesh around the considered structure that would provide convergence of the results.

**Keywords :** computational electromagnetic, coaxial feed, microstrip antenna, TLM modelling

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