

## Original Article

# Analysis of a Stepped Air Line Using an Air Line Simulator

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### Abstract

A stepped air line is investigated by using the mode matching method with mode expansion in the transverse direction of the line. To account for the effect of the air line loss, particularly on the propagation constant, a loss compensation is applied. Next, we develop a stepped air line simulator with a GUI-based program language. The competitiveness of the simulator is numerically verified with simulated results of a commercial FEM tool and experimentally with measured results of commercially available air lines with a vector network analyzer up to 50 GHz. Simulated S-parameters of a stepped air line with specific step diameters are presented.

### Keywords

Stepped air line – Mode matching method – S-parameters – FEM – Edge effect