Design of a radial waveguide feed network for a pin-fed array antenna

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Abstract: An efficient design procedure for a radial waveguide feed network for an array antenna, whose radiating elements are pin-fed, is presented. A model of the feed network is considered and relevant design parameters are expressed by simple analytic terms. To facilitate the design of the feed, a useful coupling chart for a pin-loaded radial waveguide is suggested. It shows graphically the dependence of the coupling coefficients between the radially outward-travelling wave and the feeding pins on the length of their protrusion inside the waveguide. To render the model more realistic, the mutual coupling occurring between the pins within the waveguide is not neglected. Instead, it is taken into account by use of the known expressions for the mutual resistance and reactance between two equal-length and side-by-side parallel monopoles. Results are verified by experimental data available in the literature.