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Electrodynamics of new submillimeter transmission lines based on flat waveguide splitters

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Submillimeter waves become even more widely used in satellite technologies. The evolution of the circuit technology of send/receive devices is largely determined by the quality of transmission lines. The advanced circuit technologies are used not only in power transmission but also as a basis for construction of filters, antennae, mixers, splitters, polarizers, etc. We provide an overview of new types of transmission lines based on planar cut-off waveguides with or without dielectric filling. The idea for the new class of transmission lines was inspired be a discovery made in Microwave Devices Laboratory, Karazin State University, Kharkiv, Ukraine. The laboratory found that cut-off waveguides are able to maintain Eigen-oscillation mode in their branching areas acting as semi-open resonators. Using an original method of partial areas, we obtained and calculated dispersion relations that describe the spectrum dynamics of normal modes. The characteristic feature of the method used consists in term by term satisfaction of the boundary conditions for the electric component of a mode; that technique ensures a high convergence rate of the calculations. We provide calculated losses for the most promising transmission lines. The calculation results demonstrate the advantages of these lines over the known line types.

Biography

Alexander G Yushchenko at National Technical University "Kharkiv Polytechnic Institute", Ukraine is a multi-science investigator. His research interests cover electrodynamics of new types of dielectric waveguide structures, expert systems, evolutionary modeling, theory of creative processes, neural networks, etc. For a long time he worked in Microwave Devices Laboratory of a Karazin State University, Kharkiv, Ukraine, where he made a career from an engineer to a chief designer of filter development for defense industry of the former USSR (S-300 and Buk-M2 missiles, etc.). He led the competitive research of the Ministry of Science and Education of Ukraine that was devoted to the development of satellite and cable communications and television in Ukraine. He has published about 150 scientific papers, has 12 patents of the USSR, Russia and Ukraine. His principal scientific achievements and CV have been listed in international directories.

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