

波导横向膜片带通滤波器的全波分析和精确设计

翟阳文, 史小卫, 赵永久

(西安电子科技大学 天线与微波技术重点实验室, 陕西 西安 710071)

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摘要 对矩形波导横向膜片的不连续性进行精确的全波分析的基础上, 结合滤波器设计理论, 将膜片等效为一阻抗倒置器, 其值由全波分析法获得. 然后与由滤波器综合理论获得的阻抗倒置器的值对应起来, 建立超越方程, 求解该方程就可以获得滤波器所需要的膜片尺寸. 所设计的滤波器尺寸不需要反复调整, 提高了设计效率和精度. 并给出了膜片尺寸与带通滤波器带宽的关系曲线, 对在滤波器设计时选择合适膜片结构有较好的指导意义. 最后以半波长谐振腔带通滤波器为例, 设计了几只波导带通滤波器, 设计值与软件仿真, 实测值吻合良好.

关键词 [滤波器设计](#) [全波分析](#) [阻抗倒置器](#) [膜片尺寸](#)

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Full-wave analysis and rigorous design of the waveguide transverse iris band-pass filter

ZHAI Yang-wen, SHI Xiao-wei, ZHAO Yong-jiu

(Key Lab. of Antennas and Microwave Technology, Xidian Univ., Xi'an 710071, China)

Abstract

The transverse iris of a rectangular waveguide is analyzed by the full wave technique, and combined with the design theory of the filter, the iris is equivalent to an impedance inverter, whose parameter is obtained by full wave analysis, and then a transcendental equation is established by equaling the inverter parameter obtained by the filter synthesis theory with the former. The dimension of the iris can be obtained by solving the equation. The relation between iris's dimension and bandwidth of the band-pass filter is analyzed, which can be of constructive significance in the choice of iris structure for the filter design. Adjustments of the dimension of the designed filter are avoided, and the design is more efficient and more rigorous. Finally, several waveguide band-pass filters are designed based on a half-wave resonance cavity model, and the design values agree well with those of the emulator and experiment.

Key words [filter design](#) [full-wave analysis](#) [impedance inverter](#) [iris dimension](#)

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