

## 一种波束赋形相控阵天线的分析与设计

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**摘要** 设计了一种水平面赋形、俯仰面扫描的一维相控阵天线, 天线单元采用印刷振子. 为了获得低副瓣, 馈电电流采用泰勒分布. 为了满足 $0.2^\circ$  扫描步进指标要求, 采用虚位技术, 通过4位移相器实现9位移相器功能, 简化了设备, 降低了成本. 测试表明: 在 $\pm 15^\circ$  扫描范围内, 半功率波束宽度小于 $2.3^\circ$ , 增益大于25dB, 副瓣低于-25dB, 水平赋形方向图3dB波束宽度 $33^\circ$ , 满足设计指标要求.

**关键词** [相控阵天线](#) [印刷振子](#) [波束赋形](#) [泰勒分布](#) [虚位技术](#)

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## Analysis and design of a phased array antenna with a shaped pattern

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### Abstract

A phased array antenna, which scans in the elevation plane with the shaped pattern in the azimuth plane, is analyzed and designed. The printed dipole is used as radiating elements. The fed current distribution in the scan plane adopts the Taylor amplitude illumination function in order to obtain a low sidelobe lever. The technology of virtual displacement with 4bit digital phase shifters instead of 9bit is used to satisfy the smallest steering increment of  $0.2^\circ$ , which simplifies facilities and lowers the cost. It is proved by reliable tests that within the scanning range of  $\pm 15^\circ$ , the half power beamwidth is less than  $2.3^\circ$ , that the gain is higher than 25dB, that the sidelobe lever is lower than -25dB, and that the shaped beam width is  $33^\circ$ , which perfectly satisfies the requirements. <BR>

**Key words** [phased array antennas](#) [printed dipole](#) [shaped pattern](#) [Taylor amplitude illumination function](#) [the technology of virtual displacement](#)

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