

Microwave Memos

Memo 9

Phaser Utilizing a Half Reflector and Ground Plane

In the context of a narrowband HPM radiator the basic horn/reflector antenna system is a good choice [7]. This is augmented for the high electric fields by evacuated waveguide, dielectric bag for SF₆, and special horn-exit interface [1].

As shown in Fig. 1, this concept is also directly applicable to a narrowband HPM system (a phaser [4-6]). In this case the IRA feed (conical TEM transmission line) is replaced by a horn bonded to the ground plane (a half horn, if you like) with its phase center at the focus of the paraboloid (or half the paraboloid, if you like). The horn is fed by the usual rectangular waveguide (e.g., WR 975 for 1 GHz) passing through the ground plane in an E-plane bend. The waveguide has the usual one-to-two height-to-width ratio. With one broad wall of the waveguide merging into the ground plane, the waveguide may be combined with its image below the ground plane to give an effective square waveguide for analysis purposes.

In [2] various configurations for reflector IRAs (impulse radiating antennas) were shown so as to adapt the basic geometry to various situations. One of these, the half IRA, was discussed for its potential advantages. In particular it allowed various "garbage" (such as the pulsed-power equipment) to be placed near the paraboloidal focus without being in front of the antenna beam from the reflector.

The Xatron (generic microwave tube with Xa substituting for klys, magne, etc.) [3] feeds the waveguide below the ground plane. This and the ancillary pulse power equipment are all below the ground plane as well, thereby avoiding the beam from the reflector.

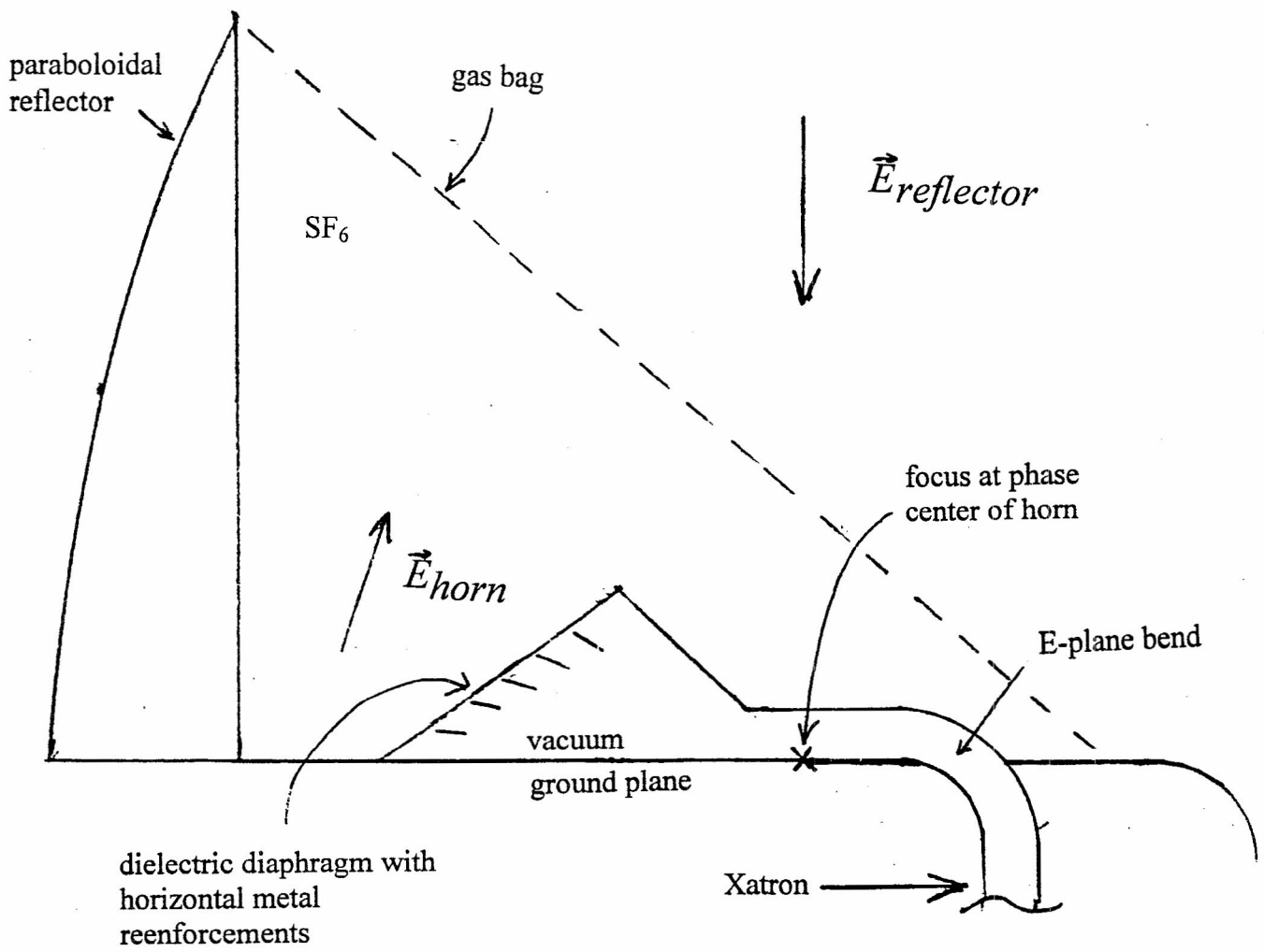


Figure 1. Half-Reflector Phaser

References

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3. C.E. Baum, Combining RF Sources Using C_N Symmetry, Circuit and Electromagnetic System Design Note 37, June 1989.
4. C.E. Baum, The Phaser, Microwave Memo 2, November 1988.
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7. C.D. Taylor and D.V. Giri, *High-Power Microwave Systems and Effects*, Taylor & Francis, 1994.