Abstracts

Direct PO Optimized Dual-Offset Reflector Antennas for Small Earth Stations and for Millimeter Wave Atmospheric Sensors

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An efficient direct numerical synthesis method for dual offset reflector antennas is described which is directly based on the physical optics procedure for both reflectors (PO-PO-method) and where the reflector surfaces are advantageously characterized in the spatial domain by a two-dimensional Fourier-transformation. The method involves an evolution strategy optimization algorithm in order to shape immediately both reflectors, so as to generate the desired far field with prescribed criteria. The efficiency of the design method is demonstrated for two computer-optimized dual offset antenna design examples for space applications. The first example, a very compact optimum shaped Gregorian dual offset earth station antenna with high offset angle (70°) and small subreflector size (13 k) achieves a very low sidelobe attenuation level within the envelope of only 23-25 log OdBi, and low crosspolarization attenuation (38 dB). The second example, a shaped dual offset Cassegrain atmospheric sensor antenna for 200 GHz, demonstrates that beam scanning by more than 10 half-power beamwidths is possible with nearly constant half-power beamwidth by simply displacing linearly the subreflector. The consequent advantage is the very low mass to be moved. The theory is verified by available measured results.

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