

## Grating Structure Design for Refraction to a Desired Direction

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In this article, waveguide design at infrared/radio frequency wavelength with asymmetric surface gratings is proposed to guide the radiated beam through an aperture to a desired direction. Grating structure is positioned to generate the surface plasmon effect at the outlet of radiated light and its optimal shape is obtained through the structural optimization scheme based on the phase field method. The material property of the grating is also important for generating collimated beams from sub-wavelength slits or holes surrounded by corrugated surfaces and this study adopts dielectric materials to compose the structure. The design objective is set to maximize the Poyting vector in the measuring area located at a desired direction and it is focused to find a clear shape of grating structure for the manufacturing feasibility to be taken into account. The simulation and optimization process has been performed by finite element analysis using the commercial package COMSOL associated with the Matlab programming.

**Keywords:** Grating structure, Surface Plasmon, Structural optimization, Finite element analysis

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