Surface Waves on Stealth Aircraft

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Full title

The Characterization of Surface Waves on Low-Observable Structures

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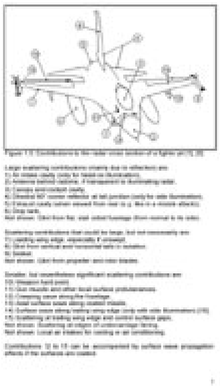
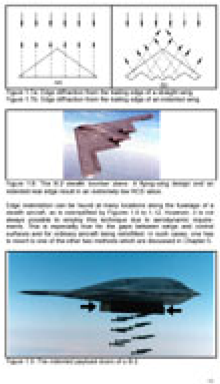
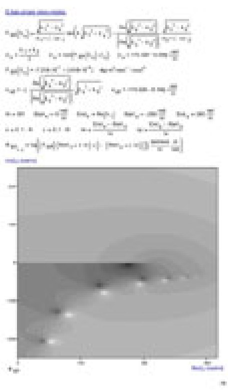
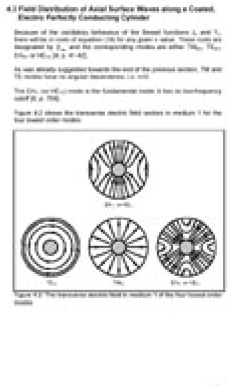
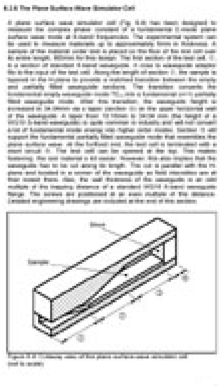
Highlights

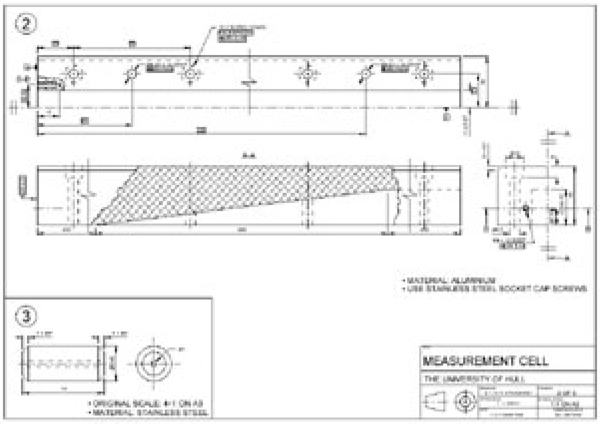












Abstract

Edge diffracted waves resulting from surface discontinuities contribute significantly to the radar cross section of an object. Although this problem could be alleviated by altering the shape of the edge discontinuity, this is not always possible due to other mission requirements.

The backscatter from edge diffracted waves may also be reduced by converting the incoming radar waves into surface waves whose intensity is significantly reduced before reaching the surface discontinuity. This can be achieved by employing isotropic surface wave absorbing materials backed by a metal surface. However, for plane surface waves, the effectiveness of these materials is shown to be strongly polarization dependent.

This work suggests a new strategy which involves replacing the scattering surface by an electromagnetic soft surface. This would result in a complete elimination of the edge diffracted waves in the radar direction, independently of radar polarization.

Furthermore, a new measuring apparatus based on a partially filled rectangular waveguide has been developed for determining the attenuation constant and phase constant of plane surface waves propagating along metal-backed surface wave absorbing materials. Measurements are presented which validate this new measuring method.

Keywords
Radar Cross-Section (RCS) Management, Surface Waves, Radar Absorbing Materials, Electromagnetic Measurements

Contents

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Publications

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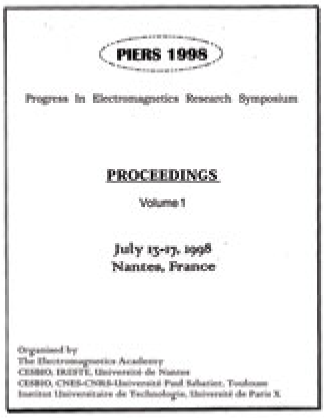
  S. Y. M. R. Stroobandt and F. C. Smith, "Method for measuring the attenuation and phase constants of a surface wave propagating along an infinite plane," *Electronics Letters*, 33(20):1685–1686, September 1997

- 

  F. C. Smith and S. Y. M. R. Stroobandt, "The design principles and measurement of surface wave absorbing materials," *Progress in Electromagnetics Research Symposium (PIERS) Proceedings*, Volume 1, page 369, July 1998