1035-65-1509 **Harun Kurkcu*** (kurkcu@math.umn.edu), 27 Vincent Hall, 206 Church St. S.E., Minneapolis, MN 5545, and **Fernando Reitich**, 27 Vincent Hall, 206 Church St. S.E., Minneapolis, MN 55455.

An efficient algorithm for the solution of high-frequency scattering by infinite rough surfaces.

We present an efficient algorithm for the numerical solution of high-frequency problems of electromagnetic and acoustic scattering by infinite periodic rough surfaces in two dimensions. The basic elements of the approach are based on extensions of the ideas for the treatment of bounded-obstacle configurations. Briefly, the methodology relies on the solution of the integral-equation formulation of the problem wherein a high-frequency geometrical optics ansatz is used for the unknown surface density and the integration is localized to "critical points". An additional difficulty that arises in the context of infinite periodic surfaces relates to the effective evaluation of the corresponding quasi-periodic Green function G. In this connection a novel scheme is presented that can be shown to outperform every alternative numerical evaluation procedure. In more detail, the algorithm is based on the use of some exact integrals that arise on judicious manipulation of the integral representation of G. This reduces the overall integration problem to a sequence that can be effectively handled by standard quadrature formulas. Numerical results are included that show that our algorithm compares favorably with alternative methods. (Received September 20, 2007)