A semielliptical channel flush-mounted on an infinite metallic plane and slotted along its interfocal strip is considered. The channel is filled with a material isorefractive to the material filling the half-space above it. In particular, the two materials may be the same, e. g. air. The primary source may be a plane wave obliquely incident on the structure from the half-space above it and either E- or H-polarized, or an electric or magnetic line source parallel to the channel axis and located inside or outside the channel, or an arbitrarily located electric or magnetic Hertzian dipole parallel to the channel axis. Exact solutions for all these boundary-value problems have been developed in terms of expansions in series of products of radial and angular Mathieu functions (P. L. E. Uslenghi, this Digest). The purpose of this work is to present and discuss numerical results based on the evaluation of the infinite series of eigenfunctions representing the exact solutions.

The notation adopted for the Mathieu functions is that of Stratton (Electromagnetic Theory. New York: McGraw-Hill, 1941), also adopted by Bowman, Senior and Uslenghi (Electromagnetic and Acoustic Scattering by Simple Shapes. New York: Hemisphere, 1987) and many others. The volume Tables Related to Mathieu Functions (National Bureau of Standards, Applied Mathematics Series No. 59. Washington, DC: U.S. Government Printing Office, August 1967) contains the relations and formulas used in obtaining our numerical results. We calculate the surface current density on the semielliptical walls of the channel and on the thin metal baffles separating the channel from the upper half-space; the fields at the interface between the two isorefractive media on the interfocal strip connecting the channel to the upper half-space; and the far field in the upper half-space. Special attention is devoted to the case of a narrow interfocal strip, when the channel and the half-space above it are electromagnetically connected via a gap whose width is small compared to the wavelength.