# Abstracts

## Transmission Modes in a Braided Coaxial Cable and Coupling to a Tunnel Environment

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Radio frequency transmission in a semicircular tunnel containing a braided coaxial cable is considered. The general formulation accounts for both the ohmic losses in the tunnel wall and a thin lossy film layer on the outer surface of the dielectric jacket of the cable. Using a quasi-static approximation, it is found that the propagation constants of the low-frequency transmission line modes are obtained through the solution of a cubic equation. However, for the special case when the conductivity thickness product of the lossy film layer vanishes, this cubic equation reduces to a quadratic. The spatially dispersive form of the braid transfer impedance is also accounted for. It is shown that the quasistatic theory is well justified for frequencies as high as 100 MHz for typical tunnel geometries. Finally, special characteristic impedances are derived for the various modes of the equivalent multiconductor transmission line.

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