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Studies on ELF propagation through the Earth-Ionosphere waveguide using an integral equation approach

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A method for investigating ELF propagation through the Earth-Ionosphere waveguide has been presented using integral equation approach. The analyses are made for uniform and non-uniform cavities to examine and estimate the relative importance of the day-night asymmetry on the diurnal and seasonal amplitude variations of the first Schumann resonance mode. The properties of the Earth-ionosphere waveguide is considered to change significantly only over a lateral distance comparable with the 2/3 width of the first Fresnel zone. The wave equations have been transformed into integral equations which maintain the accountability of the full wave properties. The solutions of the integral equations are derived by WKB method which have been critically examined under different source positions.

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