

ELF Wave Propagation Simulation using FDTD Method and Satellite Constellation Concept for Early Warning System

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Abstract—Earthquake is a hazardous event resulted in physical loss including fatalities. Early warning system is one of the important factors to reduce the risk of this disaster. However, in some areas (mostly remote areas) and countries, early warning system is still not working properly. Recent studies of ULF/ELF shows the electromagnetic profile disturbance prior to earthquake. This paper presents the simulation of ULF/ELF propagation along 3D cylindrical waveguide. Three key parameters are used to simulate the seismic propagation wave: radius (r), angle (ϕ) and depth (z). While simulation was done to see the wave propagation, the alert system concept is proposed using satellite constellation. Ground based sensor records the electromagnetic waves which are then processed by the station using FDTD method. Finally, to overcome remote area problems, the station will send the processed received data to the satellite, which relay the information to the main ground station.

Keyword—FDTD, Earthquake Precursor, ULF/ELF, Satellite, Constellation



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