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2D Seismic Wave Forward Modeling by Finite-Difference Method

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The purpose of this work is to study and develop a forward modelling computer program of 2D seismic wave by using finite-difference method. Forward modeling is a method that shows how seismic wave propagates through particular subsurface area, and also one of the schemes in Inversion method which is used for modeling the prospect area from the acquired seismic field data. Despite the fact that this method can be done by various techniques, this work will focus on using finite-difference approximation to solve the wave equation. To clarify this, the subsurface model is built and divided into grids and nodes which represent the physical properties corresponding with seismic wave propagation. After that, the equation of motion will be solved spatially and temporally on each node by finite-difference method with the consideration of initial and boundary condition to obtain its displacement value; the displacement on the surface in a period of time can be shown as "Synthetic seismograms". In stability and accuracy test, the program will be conducted on various kinds of subsurface models, and its results will also be compared with that of the existed program. Furthermore, different value of the number of grid points per wavelength and stability constant will be tested in order to find the optimum value of each interested model.

Primary author: Mr SOMBUTSIRINUN, Phudit (Chiang Mai University)

Presenter: Mr SOMBUTSIRINUN, Phudit (Chiang Mai University)

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