

Development of algorithm to analyze the interaction between ACROSS source and ground motion

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The objective of this research is to analyze the interaction between an ACROSS source and the ground motion on which the source is fixed. Therefore, we have been developing the algorithm to estimate the interaction and analyzing the effect of interaction on the ground motion.

When an ACROSS source is fixed on the free surface of the ground, an observed response due to the ACROSS source is affected by some causes such as temporal change of atmospheric temperature and rain falling, and the response is temporally changed. It is considered that the temporal variations of atmospheric temperature and rain falling change the properties of the ground in the shallow region, and the change of the ground properties changes the observed response. In order to monitor the change of response due to the change of ground properties in deep, this change due to shallow region should be erased from the observed response. However, the mechanism of the change of response due to the ground properties change in shallow region has not been made clear, yet. Then, we try to make clear the mechanism and analyze the temporal change of the observed response by numerical approach.

As the first step, in this research, we have been developing the simulator to calculate the response, in which the ACROSS source and the ground are modeled as laterally oscillating rigid circular and multilayered elastic medium, respectively. Because of the accuracy of ACROSS source, effect of the interaction between ACROSS source and ground motion is considered to be negligible. Then, the ACROSS source should be modeled as the body having finite size.

In this research, we i) derive the integral equation which relates the stress (input) and the displacement (output), ii) estimate stress distribution on the rigid circular source by solving the integral equation, and iii) calculate the displacement field by substituting the calculated stress field into the integral equation. And iv) we analyze the effect of change of ground parameters on the response.