

# New method to solve the wave field as a response function of isolated linear system I. Application to ACROSS

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Intensive developmental works of ACROSS technology have been made for the past 10 years as an active methodology for structure analysis and state monitoring of the tectonically active lithosphere. The hardware and the control system technology have reached at the practical level that warrants the construction of routine ACROSS network for the underground monitoring system for whole Japanese Islands (Kunitomo & Kumazawa, this session). The two major directions demanded in the next would be (1) the systematic application to the actual monitoring system, through which the technical improvements are made further towards the reliable and stable monitoring system, and (2) the development of numerical code to enable us to compute easily the wave field in generally anisotropic, dispersive and heterogeneous medium, by which the high quality data sets acquired by ACROSS are fully utilized to provide us with the high resolution images on the Earth interiors.

The computation code demanded here has not been available so far and we have started to explore the new theory since 1999. Recently we have found a new practical approach, in which frequency-wavenumber response function is computed as a system function of an isolated linear dynamic system (AGU fall meeting, Nagai et al, 2004). The most important points in this new theory is the simplicity in the mathematics and the very small computational load without any large matrix calculus even for general wavefield in 3D. We review the structure of this new theory and preview the expected application to the ACROSS works.