Applications of the boundary element method for generating synthetic seismograms.

A. Dobson

University of Hamburg, Institut fuer Geophysik, Bundesstrasse 55, 20146, Hamburg
(dobson@dkrz.de)

The boundary element method (BEM) is a method for generating synthetic seismograms and has been used extensively in the field of earthquake seismology over the last 20 years. However, the BEM is less well known than other techniques such as finite difference or pseudospectral methods.

An important advantage of the boundary element method is the ability to generate seismograms for many source locations in one run, as long as the interface geometry in the model remains the same. A further advantage is that the BEM is able to handle interfaces of virtually any topography and can also accurately model laterally heterogeneous interfaces between fluid and solid layers, something which may be a problem for other modelling methods.

Ideas on the suitability of this method for various areas of seismology (e.g. exploration, earthquake or volcano problems) will be presented. Input model considerations and ways of making the most out of the BEM will be discussed. The BEM may be of particular use in the inversion problem associated with location and characterization of sources from earthquakes and from within volcanoes since this requires solutions to models in which only the source location and type is changed each time. Exploration seismology may also benefit from the method because many shot gathers are required for each model.