1110-65-177 **Wenyuan Liao*** (wliao@ucalgary.ca), 2500 University Drive NW, Calgary, Alberta T2N1N4, Canada. *Helmholtz decomposition based numerical method for solving 3D Elastic wave equation.*

Elastic wave equation is a coupled system of partial differential equations (PDE) that has been widely used in modeling wave propagation through an elastic medium such as the earth. Numerical solution of such model is of great interests to both Mathematicians and Geophysicists working on a variety of applications, geophysical exploration for instance. In particular numerical modeling of Elastic wave equation is an integral part of full waveform inversion and other wave equation based seismic inversion methods.However, given that the Elastic wave equation is a coupled PDE system, and the large size of the physical domain, it is a challenging task to develop efficient and accurate numerical method for it. Here we first use the Helmholtz decomposition to decouple the Elastic wave equation system into four scalar acoustic wave equations, which are then efficiently solved by compact higher-order finite difference method. Some novel boundary treatments have been developed for the new equations. The numerical solution of the Elastic wave equation is reconstructed from the previously obtained numerical solutions of the four scalar PDEs. Finally numerical examples are solved to demonstrate the efficiency and effectiveness of the newly proposed numerical method. (Received February 19, 2015)