3. Production and Propagation Analysis of Ground Vibration Radiated from a Spherical Source due to Underground Excavation

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A theoretical solution to the problem of the wave motion produced when an arbitrary pressure as a function of time acts uniformly on the wall of a spherical cavity in a homogeneous, ideally elastic, infinite medium was investigated with reference to Sharp's derivation (1942). By use of the solution, the ground response to the various elementary forms of applied pressure was provided and discussed. Dynamic behavior of ground displacement and velocity, which results from the application of source pressure, was illustrated. Through some simple examples, it is proved that the solution was useful for estimating the ground response characteristics as a clue to elucidate both blasting-induced vibration and excavating-induced vibration due to rapid geostress relief by explosives.

Key words : spherical source, P-wave propagation, ground vibration, closed-form solution of elasticity