

Comparison of Simulation Methods of Pulsed Ultrasonic Fields Radiated in Isotropic Solids

W. Djerir, T. Boutkedjirt, A. Badidi Bouda

Abstract: The modelling of pulsed ultrasonic fields radiated by transducers in materials of various types is of particular interest in industrial applications of non destructive testing. Knowledge of the ultrasonic field allows defining and optimizing the control conditions. For the calculation of harmonic and pulsed ultrasonic fields, various methods have been used such as exact, semi-analytical, asymptotic and purely numerical methods. In this work, these methods are reviewed for the case of a planar and circular ultrasonic source coupled to a semi-infinite isotropic solid. In the second part, the solution of a semi-analytical method, which uses particular approximations, is compared to that of an exact one. The numerical calculations achieved by using the exact method are very tedious but allow the interpretation of physical phenomena involved. In contrast to that, the semi-analytic one permits the calculations to be undertaken in a more reasonable time. However, Rayleigh waves and head waves are not revealed by this method.

Keywords : Ultrasound, NDT, Pulsed field, Isotropic Solid, Transducer.