**Electromagnetic Wave Scattering by Elastic Objects**

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Electromagnetic (EM) wave scattering by elastic objects includes two different physical processes. One is the electrodynamic process which is governed by Maxwell's equations and the other is the elastodynamic process, i.e. the particle perturbation under the action of EM force. This perturbation will generate elastic wave which satisfies elastic wave equation. Depending on the property of objects, the third process, i.e. thermodynamic process may probably exist. Since the effect of the latter two processes is usually very small, one ignores their functions in the EM analysis and simulation for most situations in general. However, for some special objects, such as the biological tissues in a high-power EM environment, or the piezoelectric materials exposed in EM waves, the elasticity of the materials should be considered and the analysis has to include both the elastodynamic and thermodynamic processes so that the real solutions for the problem can be obtained.

The study of EM wave interacting with elastic objects has been severely insufficient and very few publications have addressed the problem according to our literature search. Some early studies were mainly conducted by physicists and mechanical scientists. The important work can be attributed to J. J. Kyame (Wave propagation in piezoelectric crystals, J. Acoust. Soc. Amer., vol. 21, no. 3, 1949), R. D. Mindlin (Electromagnetic radiation from vibrating quartz plate, Int. J. Solids Structures, vol. 9, pp. 697-702, 1973), Y-H. Pao and K. Hutter (Electrodynamics for moving elastic solids and viscous fluid, Proc. of the IEEE, vol. 63, no. 7, pp. 1011-1021, 1975), etc.

The analysis and simulation for EM wave scattering by elastic materials require solving Maxwell's equations, elastic wave equation and thermodynamic equation simultaneously in tandem. The aforementioned publications only worked on the partial differential equation (PDE) forms of those equations for solving simple cases. In this work, we will apply the integral equation approach to solve the EM wave scattering by elastic objects numerically. We do not consider the thermodynamic process currently so that the analysis can be simplified. Numerical examples for solving EM scattering by piezoelectric materials are used to demonstrate the approach.