

Enrichment of boundary integral approximations in wave propagation using sets of plane waves

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Classical finite element and boundary element approximations for wave problems become inefficient and cumbersome when the wavelength is short in comparison with the solution domain size. In recent years, a number of approaches have been developed to overcome this limitation. One such approach involves enriching the approximation space with plane waves, so that sets of plane waves are used to multiply the usual interpolating polynomials, and the problem is reformulated so that the unknowns become the amplitudes of these approximating waves. In this talk, an enriched boundary element formulation will be presented, and it will be shown how this allows the problem size to be reduced and how accuracy can be improved. Difficulties relating to ill-conditioning and evaluation of highly oscillatory integrals will be discussed.

Dr. Jon Trevelyan: Biography

Jon obtained his BSc (1980) and PhD (1984) in Civil Engineering, University of Bristol, UK. From 1985 to 1995 he worked for the Computational Mechanics Group on commercial boundary element software. Seven of these years were spent in charge of the North American subsidiary CM Inc., Massachusetts. On his return to the UK in 1995 Jon returned to academia, and since 1996 he has been at Durham University, where he is now Head of the Mechanics Research & Teaching Group. His research spans numerical methods in wave propagation, fracture mechanics and interactive stress analysis for airframe structural design.