Title: Fully frequency-independent Hybrid Numerical Asymptotic Boundary Element Methods

Abstract: For certain geometries, the Hybrid Numerical Asymptotic Boundary Element Method (HNA BEM) can accurately represent solutions of high-frequency scattering problems in a frequency-independent number of DOFs.

In practice however, HNA BEMs require the evaluation of highly-oscillatory (and sometimes singular) integrals, which can introduce unwelcome frequency-dependence to a numerical implementation. For the 2D screen problem, I will explain how to address this, via Numerical Steepest Descent (NSD). The idea is to deform the domain of integration into the complex plane, onto a complex contour where the integrand is non-oscillatory and exponentially decaying, hence better-suited to numerical quadrature. The resulting HNA BEM has frequency-independent cost.

In this talk I will introduce HNA BEM and NSD, with the aid of some numerical examples, initially focusing on the 2D screen problem. I will end by explaining the new difficulties which arise when extending to polygonal geometries.