

# Introduction to the Helmholtz equation and the fast multipole boundary integral equation method

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## Abstract:

In this talk, we first introduced the Helmholtz equation. According to the corresponding physical problems, we are given the interior and exterior problems with some boundary conditions. Next, we introduce the boundary integral equation method (BIEM) for solving acoustic wave problems. The boundary integral equations derived using single or double layer potentials as well as those based on the Helmholtz representation using Green's function. Finally, we introduce the fast multipole method (FMM) that can accelerate the BIEM solutions for large-scale acoustic wave problems.