

# Fast Boundary Elements Methods and applications

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Fast convolution on unstructured grids have been developed for many applications (e.g. electrostatics, magnetostatics, acoustics, electromagnetics, etc.). The goal is to reduce the complexity of matrix-vector products, from  $O(N^2)$  to  $O(N \log N)$ . In this presentation, we describe a new efficient numerical method called Sparse Cardinal Sine Decomposition (SCSD), based on a suitable Fourier decomposition of the Green kernel, sparse quadrature formulae and Type-III Non Uniform Fast Fourier Transforms (type-III NUFFT). This talk summarizes this new way, provide comparisons between SCSD, FMM and H-Matrix, and gives numerical results from our new Boundary Element solver, MyBEM.

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