

## Fast Multipole Methods and Related Algorithms

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(Most work joint with [Dr. Nail A. Gumerov](#))

Ever since we began work a little over a decade ago on using translation operators to solve boundary value problems for the Helmholtz equation, we have become enthralled by the possibility that Fast Multipole Methods offer. Over recent years our work has emphasized the following themes, which I will attempt to touch on in my talk.

- 1) Space discretization via point-set data-structures and RBF interpolation
- 2) Scalar potential formulations (a.k.a. gauge potentials) for classical equations of mathematical physics
- 3) Efficient translation operators for oscillatory and regular kernels
- 4) Parallelization and the use of heterogeneous architectures
- 5) Machine Learning and application to higher dimensional problems
- 6) Teaching the FMM to a diverse student body

### **Bio**

Ramani Duraiswami is a member of the faculty of the department of computer science at the University of Maryland, College Park. He has broad research interests in a number of areas including scientific computing, spatial audio, machine learning and computer vision. He has a Ph.D. from Johns Hopkins and a B.Tech. from IIT Bombay. See [www.umiacs.umd.edu/~ramani](http://www.umiacs.umd.edu/~ramani) for more on his research.