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Y C Hon* (benny.hon@cityu.edu.hk), Department of Mathematics, City University of Hong Kong, Hong Kong, and **R Schaback**. *Harmonic kernels for solving Laplace equation on 3D domains.*

In this talk we present the recent development in using kernel-based approximation methods to solve the Laplace equation on domains in 3D by meshless collocation on scattered points of the boundary. Due to the use of new positive definite kernels, which are harmonic in both arguments and have no singularities, we can directly interpolate the solution on the boundary without the need of artificial boundary in the Method of Fundamental Solutions. In contrast to many other techniques, e.g. the Boundary Point Method or the Method of Fundamental Solutions, we provide a solid and comprehensive mathematical foundation which includes error bounds and works for general star-shaped domains. The convergence rates depend only on the smoothness of the domain and the boundary data. Some numerical examples will be demonstrated. (Received December 12, 2011)