Computational Mathematics Seminar Series

Meshless Boundary Particle Methods For Elliptic Problems

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Abstract:
Meshless methods have been developed to alleviate the difficulties arising in the con- ventional Finite Element Method (FEM). Many people have applied meshless methods to the Boundary Element Method (BEM) due to the added benefit of a decrease in dimensionality of the problem. However, most of these methods involve approxima- tion functions that lack the Kronecker delta property, such as Moving Least Squares (MLS) method, causing much difficulty in prescribing essential boundary conditions. Recently, in order to strengthen the effectiveness of meshless methods, Oh et al. developed patchwise Reproducing Polynomial Particle (RPP) shape functions and patchwise Reproducing Singularity Particle (RSP) shape functions with use of a flat-top partition of unity which satisfy the Kronecker delta property. In this talk, I will show that these shape functions effectively handle Boundary Inte- gral Equations (BIE) when used in the context of BEM. Theories and numerical examples will be presented for the Laplace equation in two and three dimensions and the Helmholtz equation in two dimensions.

Speaker's Bio:
Christopher Davis is a graduate student at the University of North Carolina at Char- lotte. He is studying Meshless Methods under the supervision of Dr. Hae-soo Oh. He will graduate this summer and will be joining Lousiana State University as a Post-doc under the supervision of Dr. Susanne Brenner.

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