1132-65-339 **Jae-Hun Jung**, **Christopher L Bresten*** (cbresten@umassd.edu), **Sigal Gottlieb**, **Saeja Oh Kim** and **Daniel Higgs**. *Recovery of High Order Accuracy in Radial Basis Function Approximations of Discontinuous Problems.*

Radial basis function (RBF) methods have been actively developed in the last decades. RBF methods are global methods which do not require the use of specialized points and that yield high order accuracy if the function is smooth enough. Like other global approximations, the accuracy of RBF approximations of discontinuous problems deteriorates due to the Gibbs phenomenon, even as more points are added. In this paper we show that it is possible to remove the Gibbs phenomenon from RBF approximations of discontinuous functions as well as from RBF solutions of some hyperbolic partial differential equations. Although the theory for the resolution of the Gibbs phenomenon by reprojection in Gegenbauer polynomials relies on the orthogonality of the basis functions, and the RBF basis is not orthogonal, we observe that the Gegenbauer polynomials recover high order convergence from the RBF approximations of discontinuous problems in a variety of numerical examples including the linear and nonlinear hyperbolic partial differential equations. Our numerical examples using multi-quadric RBFs suggest that the Gegenbauer polynomials are Gibbs complementary to the RBF multi-quadric basis. (Received July 25, 2017)