NSF/CBMS Regional Conference on "Radial Basis Functions: Mathematical Developments and Applications."

Radial Basis Functions (RBF) interpolations have proven useful for problems featuring scattered data interpolation in higher dimensions. While the first application of RBF methods can be traced back to geophysicist R.L. Hardy work of topography on irregular surfaces in the 1970's, recent developments in RBF methods for the solution of partial differential equations have generated enthusiasm among researchers and made RBF methods an emerging topic. RBF methods have become popular for their mesh-tolerance, simplicity of implementation, and dimension-independence. The impact of RBF methods is evident by the large number of publications on RBF methods which have appeared in the past decade in mathematics, physics, and engineering journals. It is a field which has grown through significant collaborations across disciplines, and the open and free exchange of ideas and MATLAB research codes. RBF methods have also been successfully applied to large scale geophysical computations, which demonstrates their great potential in simulation of physical problems. In short, RBF methods have become mainstream in numerical analysis and scientific computing.

Despite their growing popularity, there have been few, if any, conferences dedicated to RBF methods. Although RBF minisymposia are sometimes held as part of larger conferences, they are for experts to present their work, and do not encourage newcomers to the field. We propose to host the regional conference entitled "Radial Basis Functions: Mathematical Developments and Applications". **The mission of our RBF conference is to educate and motivate researchers (at all levels) and students in RBF methods, and to stimulate and inspire research in this field.** The conference will feature ten talks by two leading researchers in this field, *Bengt Fornberg* at the Applied Mathematics Department of the University of Colorado at Boulder and *Natasha Flyer* at the Institute for Mathematics Applied to Geosciences of National Center for Atmospheric Research (NCAR). In addition, supplementary forty-minute talks will be given by invited speakers who are emerging leaders in this field, who will focus on topics ranging from the numerical analysis of RBF methods to their applications to large scale physical problems. The talks will be designed to appeal to both experts and novices, and to stimulate discussion and collaboration between the speakers and attendees about recent advances and open problems in RBF.

Intellectual Merit: This conference will provide an environment to communicate the latest research and development of RBF methods in recent years. Lectures will span from the numerical analysis of RBF methods to cutting-edge implementation. This approach will deliver a broad and deep understanding of the methods from a theoretical and practical perspective. These talks will also effectively disseminate the results of NSF funded research and facilitate participants' collaboration and involvement in research on RBF methods, thus stimulating new research in the field.

Broader Impact: This conference will attract a wider and more diverse group of researchers to undertake research in RBF methods, and build a supportive community of RBF researchers. There are still many challenging issues in this field. If those theoretical and practical issues could be overcome, then there is a good chance that RBF methods could be of major importance in the simulation of complex physical problems using high order numerical methods. Additionally, an expository monograph based on ten lectures will be prepared and made available for non-participants, and a web site devoted to the conference will make it accessible to those who could not attend.