



**The Hong Kong Polytechnic University  
Department of Applied Mathematics**

# **Colloquium**

**On**

**The best of both worlds:  
hybrid approximation on the sphere**

**by**

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## **Abstract**

Many researchers have considered approximation by radial basis functions on a sphere, using scattered data. Usually there is no polynomial component in such approximations if, as here, the kernel that generates the radial functions is (strictly) positive definite. On the other hand, the utility of polynomials for approximating slowly varying components is well known -- an extreme case is the NASA model of the earth's gravitational potential, which represents the potential by a purely polynomial approximation of high degree. In this joint work with Alvis Sommariva we consider a hybrid approximation, in which there is a radial basis functions component to handle the rapidly varying and localised aspects, but also a polynomial component to handle the more slowly varying and global parts. The convergence theory (including a doubled rate of convergence for sufficiently smooth functions) make use of the "native space" associated with the positive definite kernel (with no polynomial involvement in the definition). A numerical experiment for a simple model with a geophysical flavour establishes the potential value of the hybrid approach.

**Date : 8 May, 2009 (Friday)**  
**Time : 3:00 – 4:00 p.m.**  
**Venue : Departmental Conference Room HJ610  
The Hong Kong Polytechnic University**

**\*\*\* ALL ARE WELCOME \*\*\***