1046-41-572 **Edward J Fuselier*** (edward.fuselier@usma.edu), Department of Mathematical Sciences, United States Military Academy, West Point, NY 10996, and **Grady B Wright** (wright@math.boisestate.edu), Department of Mathematics, Boise State University, Boise, ID 83725. *Vector Field Decomposition on the Sphere using Radial Basis Functions.*

A new numerical technique based on radial basis functions (RBFs) will be presented for fitting a vector field tangent to the sphere, $\mathbb{S}^2$, from samples of the field at "scattered" locations on $\mathbb{S}^2$. The method naturally provides a way to decompose the reconstructed field into its individual Helmholtz-Hodge components, i.e. into divergence-free and curl-free parts, which is useful in many applications from the atmospheric and oceanic sciences. Several approximation results for the method will be presented. In particular, Sobolev-type error estimates are obtained for both the interpolant and its decomposition. Optimal stability estimates for the associated interpolation matrices will also be presented. Finally, numerical validation of the theoretical results will be given for vector fields with similar characteristics to those of atmospheric wind fields. (Received September 08, 2008)