References

[1] R. K. Beatson, J. B. Cherrie, and C. T. Mouat. Fast fitting of radial basis functions: methods based on preconditioned GMRES iteration. *Adv. Comput. Math.*, 11(2-3):253–270, 1999. ISSN 1019-7168.

[2] J. Behrens and A. Iske. Grid-free adaptive semi-Lagrangian advection using radial basis functions. *Comput. Math. Appl.*, 43(3-5):319–327, 2002. ISSN 0898-1221.

[3] D. Bercovici, G. Schubert, G. A. Glatzmaier, and A. Zebib. Three-dimensional thermal-convection in a spherical shell. *J. Fluid Mech.*, 206:75–104, 1989.

[4] M. Bozzini, L. Lenarduzzi, and R. Schaback. Adaptive interpolation by scaled multiquadrics. *Adv. Comput. Math.*, 16(4):375–387, 2002. ISSN 1019-7168.

[5] C. Bresten, S. Gottlieb, D. Higgs, and J.-H. Jung. RBF-WENO hybrid method for hyperbolic PDEs. *Preprint*, 2008.

[6] M. Buhmann and N. Dyn. Spectral convergence of multiquadric interpolation. *Proc. Edinburgh Math. Soc. (2)*, 36(2):319–333, 1993. ISSN 0013-0915.

[7] M. D. Buhmann. *Radial basis functions: theory and implementations*, volume 12 of *Cambridge Monographs on Applied and Computational Mathematics*. Cambridge University Press, Cambridge, 2003. ISBN 0-521-63338-9.

[8] B. Burke, S. Kim, and K.-S. Kim. Partial polar decomposition inverse method applied to determination of internal stresses in an elastic complex structure. *International Journal of Solids and Structures*, 44:2010–2020, 2007.

[9] R. E. Carlson and T. A. Foley. The parameter $\mathbf{R}^2$ in multiquadric interpolation. *Comput. Math. Appl.*, 21(9):29–42, 1991. ISSN 0898-1221.

[10] G. Casciola, L. Montefusco, and S. Morigi. The regularizing properties of anisotropic radial basis functions. *Appl. Math. Comput.*, 190(2):1050–1062, 2007. ISSN 0096-3003. doi: 10.1016/j.amc.2006.11.128. URL `http://dx.doi.org/10.1016/j.amc.2006.11.128`.

[11] A. H.-D. Cheng, M. A. Golberg, E. J. Kansa, and G. Zammito. Exponential convergence and *h*-*c* multiquadric collocation method for partial differential equations. *Numer. Methods Partial Differential Equations*, 19(5):571–594, 2003. ISSN 0749-159X.

[12] T. A. Driscoll and B. Fornberg. Interpolation in the limit of increasingly flat radial basis functions. *Comput. Math. Appl.*, 43(3-5):413–422, 2002. ISSN 0898-1221. doi: 10.1016/S0898-1221(01)00295-4. URL `http://dx.doi.org/10.`

1016/S0898-1221(01)00295-4. Radial basis functions and partial differential equations.

[13] T. A. Driscoll and A. Heryudono. Adaptive residual subsampling methods for radial basis function interpolation and collocation problems. *Computers and Mathematics with Applications*, 53:927–939, 2007. http://www.mathworks.com/matlabcentral/fileexchange/authors/23817.

[14] G. E. Fasshauer. RBF collocation methods as pseudospectral methods. In *Boundary elements XXVII*, volume 39 of *WIT Trans. Model. Simul.*, pages 47–56. WIT Press, Southampton, 2005.

[15] G. E. Fasshauer. *Meshfree approximation methods with MATLAB*, volume 6 of *Interdisciplinary Mathematical Sciences*. World Scientific Publishing Co. Pte. Ltd., Hackensack, NJ, 2007. ISBN 978-981-270-634-8; 981-270-634-8. With 1 CD-ROM (Windows, Macintosh and UNIX).

[16] A. Fathy, C. Wang, J. Wilson, and S. Yang. A fourth order difference scheme for the Maxwell equations on Yee grid. *J. Hyper. Diff. Equ.*, 5:613–642, 2008.

[17] A. C. Faul, G. Goodsell, and M. J. D. Powell. A Krylov subspace algorithm for multiquadric interpolation in many dimensions. *IMA J. Numer. Anal.*, 25 (1):1–24, 2005. ISSN 0272-4979. doi: 10.1093/imanum/drh021. URL http://dx.doi.org/10.1093/imanum/drh021.

[18] N. Flyer and E. Lehto. Rotational transport on a sphere: Local node refinement with RBF. *Journal of Computational Physics*, 229:1954–1969, 2010.

[19] N. Flyer and G. B. Wright. A radial basis function method for the shallow water equations on a sphere. *Proc. Roy. Soc. A*, 465:1949–1976, 2009.

[20] B. Fornberg. *A practical guide to pseudospectral methods*, volume 1 of *Cambridge Monographs on Applied and Computational Mathematics*. Cambridge University Press, Cambridge, 1996. ISBN 0-521-49582-2.

[21] B. Fornberg and N. Flyer. The gibbs phenomenon for radial basis functions. *Ed. A. Jerry Sampling Publishing.*

[22] B. Fornberg and C. Piret. A stable algorithm for flat radial basis functions on a sphere. *SIAM J. Sci. Comput.*, 30(1):60–80, 2007/08. ISSN 1064-8275. doi: 10.1137/060671991. URL http://dx.doi.org/10.1137/060671991.

[23] B. Fornberg and G. Wright. Stable computation of multiquadric interpolants for all values of the shape parameter. *Comput. Math. Appl.*, 48(5-6):853–867, 2004. ISSN 0898-1221. doi: 10.1016/j.camwa.2003.08.010. URL http://dx.doi.org/10.1016/j.camwa.2003.08.010.

[24] B. Fornberg and J. Zuev. The Runge phenomenon and spatially variable shape parameters in RBF interpolation. *Comput. Math. Appl.*, 54(3):379–398, 2007. ISSN 0898-1221.

[25] B. Fornberg, N. Flyer, S. Hovde, and C. Piret. Locality properties of radial basis function expansion coefficients for equispaced interpolation. *IMA J. Numer. Anal.*, 28(1):121–142, 2008. ISSN 0272-4979. doi: 10.1093/imanum/drm014. URL `http://dx.doi.org/10.1093/imanum/drm014`.

[26] B. Fornberg, N. Flyer, and J. Russell. Comparisons between pseudospectral and radial basis function derivative approximations. *IMA Journal of Numerical Analysis*, 2009.

[27] B. Fornberg, E. Larsson, and N. Flyer. Stable computations with Gaussian radial basis functions in 2-D. *Uppsala University Technical Report*, 2009.

[28] C. Franke and R. Schaback. Solving partial differential equations by collocation using radial basis functions. *Appl. Math. Comput.*, 93(1):73–82, 1998. ISSN 0096-3003.

[29] P. Giesl. Construction of a local and global Lyapunov function using radial basis functions. *IMA J. Appl. Math.*, 73(5):782–802, 2008. ISSN 0272-4960. doi: 10.1093/imamat/hxn018. URL `http://dx.doi.org/10.1093/imamat/hxn018`.

[30] P. Giesl and H. Wendland. Approximating the basin of attraction of time-periodic ODEs by meshless collocation. *Discrete Contin. Dyn. Syst.*, 25(4):1249–1274, 2009. ISSN 1078-0947. doi: 10.3934/dcds.2009.25.1249. URL `http://dx.doi.org/10.3934/dcds.2009.25.1249`.

[31] N. A. Gumerov and R. Duraiswami. Fast radial basis function interpolation via preconditioned Krylov iteration. *SIAM J. Sci. Comput.*, 29(5):1876–1899 (electronic), 2007. ISSN 1064-8275. doi: 10.1137/060662083. URL `http://dx.doi.org/10.1137/060662083`.

[32] H. Harder. Phase transitions and the three-dimensional planform of thermal convection in the martian mantle. *J. Geophys. Res.*, 103:16775–16797, 1998.

[33] R. Hardy. Multiquadric equations of topography and other irregular surfaces. *J. Geophys. Res*, 76:1905–1915, 1971.

[34] A. Heryudono and T. Driscoll. Radial basis function interpolation on irregular domain through conformal transplantation. *submitted to Journal of Scientific Computing.*

[35] A. Heryudono, R. Braun, T. Driscoll, K. Maki, L. Cook, and P. King-Smith. Single-equation models for the tear film in a blink cycle: realistic lid motion. *Math. Med. Biol*, 24:347–377, 2007.

[36] Z. Hu, S. Wise, C. Wang, and J. Lowengrub. Stable and efficient finite-difference nonlinear-multigrid schemes for the phase-field crystal equation. *J. Comput. Phys.*, 228:5323–5339, 2009.

[37] R. Jakob-Chien, J. J. Hack, and D. L. Williamson. Spectral transform solutions to the shallow water test set. *J. Comp. Phys.*, 119:164–187, 1995.

[38] J.-H. Jung. A note on the Gibbs phenomenon with multiquadric radial basis functions. *Applied Numerical Mathematics*, 57:213–239, 2007.

[39] J.-H. Jung and V. Durante. An iteratively adaptive multiquardic radial basis function method for detection of local jump discontinuities. *Applied Numerical Mathematics*, 59 (7):1449–1466, 2009.

[40] J.-H. Jung, S. Gottlieb, and S. Kim. Two-dimensional edge detection based on the adaptive iterative MQ-RBF method. Submitted to Applied Numerical Mathematics, 2009.

[41] J.-H. Jung, S. Gottlieb, S. O. Kim, C. Bresten, and D. Higgs. Recovery of high order accuracy in radial basis function approximaton for discontinuous problems. *Journal of Scientific Computing*, pages doi:10.1007/s10915–010–9360–7, 2010.

[42] M. C. Kameyama, A. Kageyama, and T. Sato. Multigrid-based simulation code for mantle convection in spherical shell using Yin-Yang grid. *Phys. Earth Planet. Interiors*, 171:19–32, 2008.

[43] E. J. Kansa. Multiquadrics - a scattered data approximation scheme with applications to computational fluid dynamics II: Solutions to parabolic, hyperbolic, and elliptic partial differential equations. *Computers and Mathematics with Applications*, 19(8/9):147–161, 1990.

[44] E. J. Kansa and R. E. Carlson. Improved accuracy of multiquadric interpolation using variable shape parameters. *Comput. Math. Appl.*, 24(12):99–120, 1992. ISSN 0898-1221.

[45] A. Karageorghis, C. S. Chen, and Y.-S. Smyrlis. A matrix decomposition RBF algorithm: approximation of functions and their derivatives. *Appl. Numer. Math.*, 57(3):304–319, 2007. ISSN 0168-9274. doi: 10.1016/j.apnum.2006.03.028. URL `http://dx.doi.org/10.1016/j.apnum.2006.03.028`.

[46] A. Karageorghis, C. S. Chen, and Y.-S. Smyrlis. Matrix decomposition RBF algorithm for solving 3D elliptic problems. *Eng. Anal. Bound. Elem.*, 33(12): 1368–1373, 2009. ISSN 0955-7997. doi: 10.1016/j.enganabound.2009.05.006. URL `http://dx.doi.org/10.1016/j.enganabound.2009.05.006`.

[47] S. O. Kim, Y. Earmme, and K.-S. Kim. Useful conservation sums in molecular dynamics and atomistics. *Mathematics and Mechanics of Solids*, page doi:10.1177/1081286509357338, 2010.

[48] E. Larsson and B. Fornberg. Theoretical and computational aspects of multivariate interpolation with increasingly flat radial basis functions. *Comput. Math. Appl.*, 49(1):103–130, 2005. ISSN 0898-1221. doi: 10.1016/j.camwa.2005.01.010. URL `http://dx.doi.org/10.1016/j.camwa.2005.01.010`.

[49] E. Larsson and B. Fornberg. A numerical study of some radial basis function based solution methods for elliptic PDEs. *Comput. Math. Appl.*, 46(5-6):891–902, 2003. ISSN 0898-1221.

[50] Z. Li and C. Wang. A fast finite difference method for solving Navier-Stokes equations on irregular domains. *Comm. Math. Sci.*, 1:181–197, 2003.

[51] J.-G. Liu and C. Wang. A fourth order numerical method for the primitive equations formulated in mean vorticity. *Comm. Comput. Phys.*, 4:26–66, 2008.

[52] J.-G. Liu, C. Wang, and H. Johnston. A fourth order scheme for incompressible Boussinesq equations. *J. Sci. Comp.*, 18:253–285, 2003.

[53] N. Mai-Duy and T. Tran-Cong. On the use of integrated RBFs in Galerkin approximation for elliptic problems. In *Boundary elements and other mesh reduction methods XXX*, volume 47 of *WIT Trans. Model. Simul.*, pages 169–178. WIT Press, Southampton, 2008. doi: 10.2495/BE080171.

[54] N. Mai-Duy and T. Tran-Cong. An integrated-RBF technique based on Galerkin formulation for elliptic differential equations. *Eng. Anal. Bound. Elem.*, 33(2): 191–199, 2009. ISSN 0955-7997. doi: 10.1016/j.enganabound.2008.05.001. URL `http://dx.doi.org/10.1016/j.enganabound.2008.05.001`.

[55] C. A. Micchelli. Interpolation of scattered data: distance matrices and conditionally positive definite functions. *Constr. Approx.*, 2(1):11–22, 1986. ISSN 0176-4276.

[56] R. Nair and C. Jablonowski. Moving vortices on the sphere: A test case for horizontal advection problems. *Mon. Wea. Rev.*, 136:699–711, 2008.

[57] A. Neves, T. Driscoll, A. Heryudono, A. Ferreira, C. Soares, and R. Jorge. Adaptive methods for analysis of composite plates with radial basis functions. *Accepted for publication, Mechanics of Advanced Materials and Structures*, 2010.

[58] R. Platte. How fast do radial basis function interpolants of analytic functions converge? *Submitted to IMA J. Numer. Anal.*

[59] R. B. Platte and T. A. Driscoll. Computing eigenmodes of elliptic operators using radial basis functions. *Comput. Math. Appl.*, 48(3-4):561–576, 2004. ISSN 0898-1221.

[60] R. B. Platte and T. A. Driscoll. Polynomials and potential theory for Gaussian radial basis function interpolation. *SIAM J. Numer. Anal.*, 43(2):750–766 (electronic), 2005. ISSN 0036-1429.

[61] R. B. Platte and T. A. Driscoll. Eigenvalue stability of radial basis function discretizations for time-dependent problems. *Comput. Math. Appl.*, 51(8):1251–1268, 2006. ISSN 0898-1221.

[62] W. Putman and S. Lin. Finite-volume transport on various cubed-sphere grids. *J. Comp. Phys.*, 227:55–78, 2007.

[63] S. Rippa. An algorithm for selecting a good value for the parameter c in radial basis function interpolation. *Adv. Comput. Math.*, 11(2-3):193–210, 1999. ISSN 1019-7168.

[64] S. A. Sarra. Adaptive radial basis function methods for time dependent partial differential equations. *Appl. Numer. Math.*, 54(1):79–94, 2005. ISSN 0168-9274.

[65] S. A. Sarra. Digital total variation filtering as postprocessing for radial basis function approximation methods. *Computers and Mathematics with Applications*, 52: 1119–1130, 2006.

[66] R. Schaback. Error estimates and condition numbers for radial basis function interpolation. *Adv. Comput. Math.*, 3(3):251–264, 1995. ISSN 1019-7168.

[67] C. Shu, H. Ding, and K. S. Yeo. Computation of incompressible Navier-Stokes equations by local RBF-based differential quadrature method. *CMES Comput. Model. Eng. Sci.*, 7(2):195–205, 2005. ISSN 1526-1492.

[68] C. Shu, Y. Y. Shan, and N. Qin. Development of a local MQ-DQ-based stencil adaptive method and its application to solve incompressible Navier-Stokes equations. *Internat. J. Numer. Methods Fluids*, 55(4):367–386, 2007. ISSN 0271-2091.

[69] W. F. Spotz, M. A. Taylor, and P. N. Swarztrauber. Fast shallow water equation solvers in latitude-longitude coordinates. *J. Comp. Phys.*, 145:432–444, 1998.

[70] K. Stemmer, H. Harder, and U. Hansen. A new method to simulate convection with strongly temperature-dependent and pressure-dependent viscosity in spherical shell. *Physics of the Earth and Planetary Inter.*, 157:223–249, 2006.

[71] M. Taylor, J. Tribbia, and M. Iskandarani. The spectral element method for the shallow water equations on the sphere. *J. Comp. Phys.*, 130:92–108, 1997.

[72] C. Wang, J.-G. Liu, and H. Johnston. Analysis of a fourth order finite difference method for incompressible Boussinesq equations. *Numer. Math.*, 97:555–594, 2004.

[73] H. Wendland. Piecewise polynomial, positive definite and compactly supported radial functions of minimal degree. *Adv. Comput. Math.*, 4(4):389–396, 1995. ISSN 1019-7168.

[74] H. Wendland. *Scattered data approximation*, volume 17 of *Cambridge Monographs on Applied and Computational Mathematics*. Cambridge University Press, Cambridge, 2005. ISBN 978-0521-84335-5; 0-521-84335-9.

[75] S. Wise, C. Wang, and J. Lowengrub. An energy stable and convergent finite-difference scheme for the phase-field crystal equation. *SIAM J. Numer. Anal.*, 47:2269–2288, 2009.

[76] G. Wright and N. Flyer. A hybrid RBF-pseudospectral method for thermal convection in a 3-D spherical shell. *to be submitted to Int. J. Num. Meth. Fluid.*

[77] G. B. Wright and B. Fornberg. Scattered node compact finite difference-type formulas generated from radial basis functions. *J. Comput. Phys.*, 212(1):99–123, 2006. ISSN 0021-9991.

[78] G. B. Wright, N. Flyer, and D. Yuen. A hybrid radial basis function - pseudospectral method for thermal convection in a 3-d spherical shell. *Geophysics, Geochemistry, Geosystems*, submitted, 2010.

[79] Y. L. Wu and C. Shu. Development of RBF-DQ method for derivative approximation and its application to simulate natural convection in concentric annuli. *Comput. Mech.*, 29(6):477–485, 2002. ISSN 0178-7675.

[80] J. Yoon. Spectral approximation orders of radial basis function interpolation on the Sobolev space. *SIAM J. Math. Anal.*, 33(4):946–958 (electronic), 2001. ISSN 0036-1410.

[81] S. Zhong, A. McNamara, E. Tan, L. Moresi, and M. Gurnis. A benchmark study on mantle convection in a 3-D spherical shell using CitcomS. *Geochem. Geophys. Geosyst.*, 9:Q10017, 2008.