

MATH 4503/6503: Numerical methods for differential equations (Winter 2014)



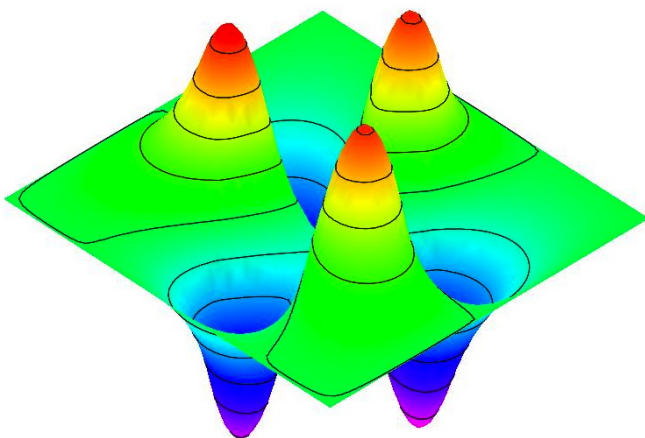
Instructor: Sanjeev Seahra (sseahra@unb.ca)

Website: www.math.unb.ca/~seahra/4503/

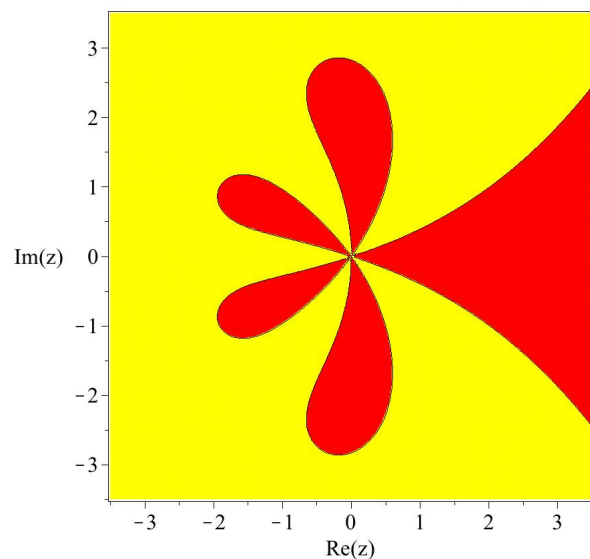
Description: The principal goal of this course is to give students “hands-on” experience in solving ordinary and partial differential equations (ODEs and PDEs) using (primarily) finite difference methods. The emphasis will be on *practical* scientific computing; i.e., the construction of numerical algorithms to deal with actual problems in the physical, biological or engineering sciences using software such as MATLAB or MAPLE.

- Topics:**
- solution of ODEs (initial and boundary value problems)
 - solution of parabolic and hyperbolic PDEs (stability of numerical schemes, implicit and explicit methods)
 - solution of elliptic PDEs (matrix/iterative methods)
 - finite element methods in 1D and 2D (time permitting)

Text: *Finite difference methods for ordinary and partial differential equations* by Randall J. LeVeque (available from the bookstore)



*Electric potential generated by
a ring of alternating charged discs
(example from lectures)*



*Relative stability region for the
classic 4th order Runge-Kutta method
(assignment problem)*