

# Graduate Seminar

**Dr. Ron Haynes,  
Memorial University**

**Thursday, October 18, 2018  
1:00pm, HH-3017**

**Parallel methods for PDE based mesh generation and other  
nonlinear problems**

**Abstract:**

An approach to solve PDEs whose solutions evolve on disparate space and time scales is to introduce adaptive and dynamic meshes. In this talk we will review a class of PDE based mesh generators in 1D and 2D. Here a PDE for the mesh is formulated and coupled with the physical PDE of interest. The hope is that the cost of computing the mesh should not substantially increase the total computational burden and ideally will fit within the framework being used to solve the physical PDE. Here we consider parallel solution strategies for the mesh PDE and the coupled system using various domain decomposition strategies. The analysis of the algorithms reminds us of several classical tools from the 1950s and 1960s including Peaceman-Rachford iterations and monotone convergence using the theory of M-functions. The study of this problem has led to recent progress for the parallel solution of other nonlinear problems.