PIMS / AMI Seminar

Friday, March 1, 2019
3:00 p.m.
CAB 657

"A proof that Anderson acceleration really does accelerate convergence in fixed point iterations with application to incompressible flow"

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Abstract

We propose, analyze and test Anderson-accelerated Picard iterations for solving the incompressible Navier-Stokes equations (NSE). Anderson acceleration has recently gained interest as a strategy to accelerate linear and nonlinear iterations, based on including an optimization step in each iteration. We extend the Anderson-acceleration theory to the steady NSE setting and prove that the acceleration improves the convergence rate of the Picard iteration based on the success of the underlying optimization problem. The convergence is demonstrated in several numerical tests, with particularly marked improvement in the higher Reynolds number regime. Our tests show it can be an enabling technology in the sense that it can provide convergence when both usual Picard and Newton iterations fail. Lastly, generalization of the theory to general fixed point iterations will be given.