ACMS Applied Math Seminar

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Thursday, October 31, 2019
154 Hurley Hall
3:30 - 4:30 P.M.

WaveHoltz: Parallel and Scalable Solution of the Helmholtz Equation via Wave Equation Iteration

We introduce a novel idea, the WaveHoltz iteration, for solving the Helmholtz equation inspired by recent work on exact controllability (EC) methods. As in EC methods our method make use of time domain methods for wave equations to design frequency domain Helmholtz solvers but unlike EC methods we do not require adjoint solves. We show that the WaveHoltz iteration we propose is symmetric and positive definite in the continuous setting. We also present numerical examples, using various discretization techniques, that show that our method can be used to solve problems with rather high wave numbers.

This is joint work with, Fortino Garcia, University of Colorado, Boulder, USA and Olof Runborg, Royal Institute of Technology, Stockholm, Sweden.