Department of Industrial and Enterprise Systems Engineering

GE/IE 590 Seminar

Design of approximation methods using convex optimization

Agustín Bompadre

Postdoctoral Scholar
California Institute of Technology (Caltech)

Abstract

Approximation methods are used in many engineering applications to solve numerically partial differential equations. In this context, the Finite Element Methods are one of the most popular mesh-based techniques. In this talk, we discuss meshfree approximation methods, which are approximation methods that do not need a meshing of the domain, and so bypass some of the numerical shortcomings of mesh-based methods. We provide sufficient conditions for meshfree methods to guarantee uniform error bounds on the resulting approximation.

Next, we review the Local Maximum-Entropy approximation scheme, a meshfree approximation method defined through a convex optimization problem. Moreover, we present HOLMES, a high-order generalization of the Local Maximum-Entropy approximation scheme, which is also defined through a convex optimization problem. We show that the convergence results for general meshfree methods we developed also apply to HOLMES. Numerical examples from solid mechanics show the efficiency of the new method in practice.

Biography

Agustín Bompadre is a postdoctoral scholar at Caltech and currently works on the design and analysis of meshfree approximation methods using convex optimization. Prior to his current position he worked as a research scientist in a software company in inventory optimization. He has a PhD in Operations Research from MIT, and a Bachelor degree.in Mathematics from UBA, Argentina. His research interests are in convex, global, and discrete optimization, and he has published in Journal of Global Optimization, Networks, Computer Methods in Applied Mechanics and Engineering, and Algorithmica, among others.

Location: **101 Transportation Building**
Date: **Thursday, February 16, 2012**
Time: **4:00 p.m.**