CLAREMONT CENTER
for MATHEMATICAL SCIENCES

C C M S C O L L O Q U I U M

AN EFFICIENT REARRANGEMENT ALGORITHM FOR SHAPE OPTIMIZATION PROBLEM INVOLVING PRINCIPAL EIGENVALUE IN POPULATION DYNAMICS

by

Chiu-Yen Kao

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Abstract: In this talk, an efficient rearrangement algorithm is introduced to the minimization of the positive principal eigenvalue under the constraint that the absolute value of the weight is bounded and the total weight is a fixed negative constant. Biologically, this minimization problem is motivated by the question of determining the optimal spatial arrangement of favorable and unfavorable regions for a species to survive. The method proposed is based on Rayleigh quotient formulation of eigenvalues and rearrangement algorithms which can handle topology changes automatically. Using the efficient rearrangement strategy, the new proposed method is more efficient than classical level set approaches based on shape and/or topological derivatives. The optimal results are explored theoretically and numerically under different geometries and boundary conditions.

About the speaker: Chiu-Yen Kao is a Visiting Associate Professor in the Department of Mathematics and Computer Science at Claremont McKenna College. She received her Ph.D. degree from the University of California, Los Angeles in 2004 and was an Industrial Postdoctoral Associate at the Institute for Mathematics and its Applications (IMA), University of Minnesota during 2004-2006. After that, she joined The Ohio State University as a regular faculty member. She specializes in numerical analysis and scientific computing. Her research interests focus on shape optimization for eigenvalue problems, efficient numerical methods for nonlinear partial differential equations, and computational biology. She received Alfred P. Sloan Fellowship in 2009. Her work is also recognized by the MICCAI paper award, NSF research grants, and SIAM News.

Wednesday, February 29, 2012, at 4:15pm

Freeburg Forum (Kravis Center, LC 62), Claremont McKenna College

Refreshments at 3:45 p.m. in Freeburg Forum Courtyard & wine and cheese after the talk in CMC Math Commons Room (Adams 208)

The dinner will be hosted by Prof. Asuman Aksoy.
Please contact Prof. Aksoy if you are interested in attending the dinner.