CENTER FOR COMPUTATION & TECHNOLOGY
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LOUISIANA STATE UNIVERSITY

CCT Weekly August 7- August 13, 2011

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CCT Weekly August 9, 2011

LSU CCT Research Targets Mathematical Equations for Fully Nonlinear Second Order PDEs

Michael J. Neilan, postdoctoral research fellow at the LSU Center for Computation & Technology, has received an award from the National Science Foundation to focus on fully nonlinear second order PDEs. Titled "Novel discretization schemes for fully nonlinear partial differential equations," the award is for $127,184 for a three year period.

Partial differential equations (PDEs) are ubiquitous. Arising in a variety of physical, biological, and social phenomena, PDEs play a crucial role in the understanding and predicting of various real-world problems including modeling weather phenomena, determining the initial shape of the universe, optimal reflector design, differential geometry, optimal transport, mathematical finance, image processing, and mesh generation. However, even for simple models, PDEs cannot be solved by simple mathematical formulas, and therefore the need for accurate and efficient computational methods become necessary.

"This research is based on my recent discovery that Lagrange finite element methods and discontinuous Galerkin methods can be used to approximate the Monge-Ampére equation--the prototypical fully nonlinear second order equation," said Neilan. "As these methods are simple to implement, the computation of the highly nonlinear problem can be performed efficiently and accurately. This project will expand on these latest findings to obtain simple, efficient, and accurate numerical schemes for a general class of fully nonlinear equations."

The completion of the proposed research will produce three stages of results. The first consists of the abstract theory, various discretization methods and theoretical tools for fully nonlinear second order equations. The second will consist of the resulting application impacts of the theoretical results. As the computational aspects of these problems are still in their infancy, any progress in solving the governing equations will have an immediate impact on advancing these application areas. The third outcome is the resulting computer programs and software for implementing the methods of algorithms.

For more information on the research activities of the LSU Center for Computation and Technology, visit: http://www.cct.lsu.edu/home.

Please Note:

•   LSU CCT will host an onsite computational science courses being offered by the Virtual School of Computational Science and Engineering. The course is "Proven Algorithmic Techniques for Many-core Processors" (August 15-19). Graduate students, post-docs and professionals from academia, government and industry can gain the skills they need to leverage the power of cutting-edge computational resources at these courses, which are being offered for a $100 per-course fee. The course is one week long. For more information, visit http://www.vscse.org/.

•   The 2011 HPC User Satisfaction Survey is open for comment until August 31st. Anyone who uses high performance computing resources at LSU or LONI is invited to take a few minutes to complete the survey: http://www.hpc.lsu.edu/survey/public/survey.php?name=hpc_at_lsu_user_2011. Please help us understand your needs and future requirements.

•   Applications for the SC11 Student Volunteer Program are open and close on August 12, 2011. Undergraduate and graduate students are encouraged to apply as volunteers to help with the administration of the conference. In exchange for volunteering, they will receive complimentary conference registration, housing, and most meals. In addition, limited support will be provided for transportation expenses (such as airfare) for international students and students from groups that traditionally have been underrepresented in HPC. For more information visit http://sc11.supercomputing.org/?pg=studvol.html or email student-vols@info.supercomputing.org.

•   Prior approval is required for Special Meal Requests. Employees who make meal purchases without prior approvals may find that they must cover the cost of any monies spent for an unapproved event out of pocket. Dine-in restaurant meals are not allowed on LaCarte credit cards. Please contact Susie McGlone (susie@cct.lsu.edu) prior to any special meal with visitor(s) to file the appropriate request for approval. Prior approval could take up to two weeks, so please plan accordingly.

•   Please remember to send your news concerning grants, awards, conferences, or other pertinent information to CCT Event Coordinator Jennifer Fontenot at jennifer@cct.lsu.edu

•   Follow CCT with social media to access photos and see news, events or updated information. These pages are public; you do not need an account to view the information.
o   Facebook group : LSU Center for Computation & Technology
o   Twitter : LSUCCT
o   YouTube channel : LSUCCT

Upcoming events:

August 1- 12: iOS Boot Camp for LSU Undergraduates
August 9-11: SIGGRAPH (Booth #841), Vancouver, Canada
August 15-19: Proven Algorithmic Techniques for Many-core Processors

Upcoming Grant Deadlines:
Note: Please check the CCT deadline Web site, since it is updated daily.

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