



15th Seminar on High Performance Numerical Computing

Wednesday December 16, 2015 – 10:00 – 12:00
Amphi Bécquerel – Ecole Polytechnique - Palaiseau

Maps:

<https://www.polytechnique.edu/fr/accesetorientation>

[https://gargantua.polytechnique.fr/siatel-web/linkto/mICYYYS\)mYZ](https://gargantua.polytechnique.fr/siatel-web/linkto/mICYYYS)mYZ)

10h-11h “Optimal Control Theory and Dengue Fever”

Olga Vasilieva (Department of Mathematics, Universidad del Valle, Cali – COLOMBIA).

Abstract

Dengue is a viral disease principally transmitted by *Aedes aegypti* mosquitoes. According to WHO, about half of the world's population is now at risk of acquiring this disease. There is no vaccine to protect against dengue; therefore, dengue morbidity can only be reduced by appropriate vector control measures, such as:

- Suppression of the mosquito population,
- Reduction of the disease transmissibility.

The first part of this presentation will be focused on implementation of these external control actions using the frameworks of mathematical modelling and control theory approach. In particular, the endemo-epidemic nature of dengue propagation can be captured by an ODE model of Ross-Macdonald type during epidemic outbreak, when all four DENV serotypes circulate simultaneously, and by its endemic version of SI-SIR type during inter-epidemic periods, characterized by a strong dominance of one particular DENV serotype.

The second part will deal with an alternative and unconventional vector control technique based on the use of biological control agent called *Wolbachia*. This bacterial symbiont, when deliberately introduced into mosquitoes, has the potential to thwart the mosquito's ability to transmit the dengue virus. Therefore, a considerable reduction in dengue morbidity can be reached by a premeditated spread of *Wolbachia* among wild mosquito populations, seeking the population replacement. This decision-making process can be also modelled using the control theory approach.

Bio.

Olga Vasilieva is a Distinguished Professor at the Department of Mathematics at the Universidad del Valle in Cali, Colombia. She holds a Doctor of Engineering degree from Hiroshima University, Japan (1997) as well as a PhD in Physics and Mathematics from Irkutsk State University, Russia (2003). Her research interests are principally focused on the optimal control models and methods applied to economics, biology, ecology, epidemiology, and sustainable management of natural resources. She is an active member of AMS, SIAM, SMB and since 2007 she represents Colombia in the REALMA Network (Reseau Europe Amerique Latine en Mathématiques Appliquées, <http://www.realma.org/>). During last decade, Prof. Vasilieva has organized several international academic events on applied mathematics in the region of Latin America and has been involved in collaborative research projects sponsored by national and international foundations.



11h-12h “Strategies for Next Generation HPC Applications and Systems”

Michael A. Heroux (Distinguished Member of Technical Staff, Sandia National Lab. / Scientist in Residence, St John’s University - USA).

Abstract

The extreme-scale computing community is several years into a highly disruptive period of change. New commodity performance curves must be incorporated into application designs, and the orders of magnitude in performance potential will increase the demand to couple physics and scales into a single integrated execution environment.

In this talk we discuss several aspects of next-generation scientific and engineering applications that will be particularly challenging and easy as we prepared for new systems. We touch on application design, parallel programming strategies, software distribution and resiliency, and introduce how a productivity focus can provide new approaches to better applications.

Bio.

Michael Heroux is a Distinguished Member of the Technical Staff at Sandia National Laboratories and Scientist in Residence at St. John’s University, MN, working on new algorithm development, and robust parallel implementation of solver components for problems of interest to Sandia and the broader scientific and engineering community. He leads development of the Trilinos Project, an effort to provide state of the art solution methods in a state of the art software framework. Dr. Heroux works on the development of scalable parallel scientific and engineering applications and maintains his interest in the interaction of scientific/engineering applications and high performance computer architectures. He leads the Mantevo project, which is focused on the development of Open Source, portable mini-applications and mini-drivers for scientific and engineering applications. Dr. Heroux is also the lead developer and architect of the HPCG benchmark, intended as an alternative ranking for the TOP 500 computer systems.

Dr. Heroux is a member of the Society for Industrial and Applied Mathematics (SIAM) and past chair of the SIAM Activity Group on Supercomputing. He is a Distinguished Member of the Association for Computing Machinery (ACM). He is the Editor-in-Chief for the ACM Transactions on Mathematical Software, Subject Area Editor for the Journal on Parallel and Distributed Computing and Associate Editor for the SIAM Journal on Scientific Computing.



Registration

Registration is free, but due to security reasons it is necessary to register via this link <https://www.inscription-facile.com/form/1qvcq1Xvrd8pTawsFNxM>.

Any unregistered person cannot enter the site

A valid ID is necessary to enter the site of Ecole Polytechnique

Mr. Fan YE (CEA and Université de Lille 1 – Sciences et Technologies) will defend his PhD “New Numerical Algorithms for Efficient Utilization of Multicore and Heterogeneous Architectures” in the afternoon at 2.30 pm at the same location (Registration: <https://www.inscription-facile.com/form/BuyRNwezXQypBMY1IG5w>)

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