SPECIAL ISSUE FROM THE LAUNCHING MEETING OF NETWORKS AND HETEROGENEOUS MEDIA

The launching meeting of Networks and Heterogeneous Media took place on June 21-23 2006 in Maiori (Salerno, Italy). The meeting was sponsored by the American Institute of Mathematical Sciences, the Istituto per le Applicazioni del Calcolo of Roma, and the DIIMA of University of Salerno.

Following the spirit of the journal, the meeting gathered together contributions from the different areas covered by NHM main interests. Editorial Board members presented various results in their areas of expertise, and we chose to have four plenary speakers who are not from the Editorial Board. In the same order of the meeting, the plenary talks proceeded as follows:

- Philip K. Maini, University of Oxford, Modeling aspects of vascular cancer.
- Hiroshi Matano, University of Tokyo, Traveling waves in a sawtooth-shaped domain and its homogenization limit.
- Walter Willinger, AT& T Labs, The many facets of Internet topology.
- Carlos Daganzo, University of California at Berkeley, Traffic networks: basic components, linkages through boundary conditions, and macroscopic effects.

The contribution of Maini dealt with vascular tumor growth. The stage of vascularization of a tumor proved to be the turning point in tumor growth dynamics. A multiscale model was presented, including both ordinary differential equations for cell dynamics and partial differential equations for nutrients and other chemicals involved in the process. In particular, the effect of chemotherapy in the presence of vascular adaptation was studied.

Matano illustrated the problem of wave dynamics in heterogeneous media. New phenomena appear with respect to the homogeneous case. This is illustrated by a curvature dependent motion in a two dimensional cylinder with undulating boundary. Indeed, the speed of traveling waves in the homogenization limit depends only on maximal opening angle of the boundary.

The talk of Willinger treated the problem of internet topology modeling. The presence of different layers, going from the physical level to the more virtual ones, and organizational structures gives rise to many possible representations. Every modeling approach must take into account the meaning of nodes and edges of the network. For example, scale free networks models were discussed. Also, the problem of network traffic measurements and representation was addressed.

Daganzo's talk focused on a variational theory for car traffic. Starting from a single lane unidirectional road, various models were considered, depending on the discretization of the variables involved. Moreover, these models can be put in duality. The case of bottlenecks was studied in detail, providing conditions for a well-posed theory. Finally, the extension to multi-lanes roads and networks was illustrated.

The presentations of the pleanary speakers, together with other presentations, may be found at the web page:
http://www3.unisa.it//Dipartimenti/DIIMA/Bacheca/speakers.php

In this special issue, we collected contributions of the plenary speakers together with some papers of Editorial Board members. More precisely, Preziosi illustrates another point of view on the tumor vascularization; Karlsen deals with coupled well-reservoir flow; Klar considers optimization of supply networks; and Chen reviews control volume finite elements methods with applications to multiphase flow in porus media.

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