MATHEMATICAL MODELING FOR MEDICINE, SPORTS, AND THE ENVIRONMENT

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ABSTRACT

Classical mathematical models are used since several decades to describe complex phenomena in continuum mechanics, with applications in many diverse fields of engineering and technology.

When complexity becomes a concern, recent developments in multiscale geometrical modeling have opened the way to progress in modeling such complex systems as the human circulatory system and environmental systems. As a matter of fact, appropriate strategies can be devised to allow for an effective description of the interaction between large, 3D components, and small 1D branches. Besides, these models allow the simulation of the complex fluid-structure interaction which govern the artery wall deformation under the pressure pulse.

Similar mathematical equations can be used in a completely different context, for instance to describe the flow behavior around sailing boats, with the purpose of optimizing yacht performances . In particular I will explain the role that mathematicians have plaid in the success of the twice winning America's Cup yacht Alinghi.