Presentation of Professor Constantine Dafermos
ISIMM Prize awardee 2014

Constantine Dafermos (Costas, for friends) was born in Athens in 1941, where he was trained as a civil engineer, and received a diploma from the National Technical University of Athens in 1964. In 1967 he also received a Ph.D. in Mechanics from the Johns Hopkins University, under the supervision of Jerald Ericksen. Since 1971 he has been a professor at Brown University in Providence, where he spent his entire career.

Costas received several Awards and is a member of many Accademy:

Ordway Chair, University of Minnesota, 1985. Keeley Fellowship, Wadham College, Oxford, 2001. Honorary Doctorate, University of Athens, 1987. Honorary Doctorate, National Technical University (Greece), 1991. Honorary Doctorate, University of Crete, 2001. SIAM W.T. and Idalia Reid Prize, 2000. Cataldo e Angiola Agostinelli Prize, 2011. Galileo Medal, City of Padua, 2012.

He is also Fellow of the American Academy of Arts and Sciences, 2001-. Correspondent Member of the Academy of Athens, 1988-. Honorary Professor of the Academia Sinica, China, 2004-. Foreign Member of the Accademia Nazionale dei Lincei, Roma, 2011- Member of the Board of Governors of the Weizmann Institute of Science (Israel), 1995-. Fellow of the SIAM, 2009 .

Dafermos is member of the editorial boards of the following journals:

Quarterly of Applied Mathematics, Associate Managing Editor Acta Mathematica Scientia, Chief Co-Editor Journal of the American Mathematical Society Archive for Rational Mechanics and Analysis Mathematics Applied in Science and Technology Communications in Applied Analysis Proceedings of the Royal Society of Edinburgh International Journal of Pure and Applied Mathematics Ricerche di Matematica Annali di Matematica Pura ed Applicata Revista Matematica Complutense Bulletin of Greek Mathematical Society Journal of Dynamics and Differential Equations Journal of Hyperbolic Differential Equations

Dafermos contributed fundamental results in the field of partial differential equations of hyperbolic type, in which he was able to combine a deep mathematical rigor with a deep understanding of physical reality. In particular, he studied the interplay between thermodynamics and analysis in the theory of hyperbolic systems, and investigated the fundamental role of entropy. His remarkable ability to put together arguments of analysis with arguments of thermomechanics is maybe due to his original studies in mechanics. His book Hyperbolic Conservation Laws in Continuum Physics is the best example of the Costas point of view of the interplay between Continuum Mechanics and Mathematics. This may be regarded as a definitive work on the role of thermodynamics in the systems of conservation laws arising in continuum mechanics.

Dafermos introduced several fundamental methods in the subject of conservation laws. Here are just some of the ideas developed by Costas: - the relative entropy, as an efficient mathematical object for analyzing stability among thermomechanical theories and to compare the distance between a weak solution and a Lipschitz solution. - the concept of generalized characteristics, - the

wave-front tracking, - the entropy-rate criterion for the selection of admissible wave fans.

Dafermos also made fundamental contributions on the mathematical theory of the equations of thermomechanics, as for modeling and analysis of materials with memory, thermoelasticity, and thermoviscoelasticity.

Several researchers working in continuum mechanics and hyperbolic systems learnt a great deal from him, and all the people that had the honor to be friend with Costas as me know his warm personality, typical of a true gentleman scientist.

His whole research exhibits an interplay between mechanics and mathematics. I then really think that Costas Dafermos deserves the ISIMM prize.

Tommaso Ruggeri
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