International Research Center on
MATHEMATICS AND MECHANICS OF COMPLEX SYSTEMS

and

FONDAZIONE TULLIO LEVI CIVITA

MARCELO EPSTEIN

Tullio Levi-Civita has been one of the greatest mathematical-physicists in the XX century. His researches spanned many and various fields from more abstract mathematics to applied engineering problems. In the stream of Italian tradition in science, he was one of the most brilliant modern followers and continuators of the Archimedean spirit: his engagement in pure mathematics and logical rigor has always been directed to supply the most powerful tools to technological applications.

I want to recall to this audience that Archimedes was ***-sensu stricto-*** an Italian natural philosopher , being born and active in Syracuse, Sicily (in a period where the Greek civilization was the leading one in science and culture).

The International Research Centre for Mathematics and Mechanics of Complex Systems MEMOCS (Università dell'Aquila and Roma La Sapienza) together with the Levi-Civita foundation has established in 2010 the Tullio-Levi Civita Prize and Lecture to honor the Italian scientist but mainly to advocate his point of view in science and culture. Levi-Civita was not only one of the founders of modern differential geometry and tensor calculus but also contributed to the theory of stability and partial and ordinary differential equations. He found in his theoretical studies the motivation and conceptual tools for contributing to Engineering Sciences with works on the flow of free fluid jets, the modelling of starting impetus of towed vehicles, the mechanics of gears and a method for calculating their action lines.

One of the two recipients of the Prize in 2014 is Professor Marcelo Epstein, chosen by a committee formed by the past recipients, the successors of Levi-Civita at the University of Rome La Sapienza and scientists nominated by the Scientific Committee of MEMOCS Centre.

It is useless to try to list here the numerous academic achievements of Prof. Epstein: modern data bases and his website are a good source of information easily available.

I will exploit your time and attention to explain why the committee, after having heard his lecture held at MEMOCS center, unanimously decided to nominate him.

Prof. Epstein is a typical representative of the Renaissance ideal and cultivated scientist: he can speak fluently at least in Spanish, Italian, Hebrew and English, and has studied classical Greek, Latin and Arabic. He plays the piano, the recorder and the baroque traverse flute. His conversation spans from ancient history to modern economy, literature and advanced mathematics. He holds a degree in Classics and Early Christian Studies, and currently teaches a course on the Latin of Science at the University of Calgary.

His specific contributions to science in general and engineering sciences in particular are relative to many subjects, all of which involve a manifold and multidisciplinary vision of knowledge.

His deep understanding of differential geometry allowed him to author some books which entitle him to be proudly considered a continuator of the Levi-Civita tradition. His mastering of the differential geometric methods allowed him also to contribute to the formulation of original models for mechanically driven growth of living tissues and in general to biomechanics.

We refer to the following books:

Epstein M, “Differential Geometry:Basic Notions and Physical Examples, Springer-Veralg, 2014.

Epstein, M., ‘The Elements of Continuum Biomechanics”, Wiley, 2012.

Epstein, M., “The Geometrical Language of Continuum Mechanics”, Cambridge, 2010.

Epstein, M. and Elzanowski, M., “Material Inhomogeneities and their evolution”, Springer-Verlag, 2007.

In these essays and in the original papers which he published in the aforementioned subjects one can find a crystal clear presentation of complex mathematical concepts and an innovative way of linking mathematical concepts to mechanical and biological phenomena. Prof. Epstein never abandons the mathematical rigour of the presentation also when he deals with the applications to mechanics or biomechanics: his approach to science involves the use of the same logical tools when dealing with growth phenomena, bible translation or parallel transport.

As an engineer by training, Prof. Epstein’s competences were exploited by several private companies which needed his consulting: he proves in this activity that there is no cultural difference between “practical” engineering and theoretical science and in particular advanced mathematics. As strongly believed by the founders of modern engineering sciences, science is nourished by the observation of phenomena and the

understanding of phenomena is impossible to those who lack the needed theoretical and conceptual bases. His professional life proves once more that there is no “practical” knowledge separated from “theoretical” knowledge.

The Levi-Civita Prize Committee particularly appreciated his contributions to the theory of continuous distributions of dislocations, growth and remodeling, wave propagation in linear and nonlinear media, the mechanics of muscles and cartilages, wrinkling formation in bi-dimensional continua, fractal mechanics, Microstructured and Cosserat Continua.

Moreover, it has to be appreciated his passionate contribution to the understanding of variational principles in applied sciences, where his knowledge and mastering of differential geometry could show its importance and momentum.

He is one of the most effective advocates of the importance of these principles in applied sciences: also in this aspect he is a continuator of the spirit of Italian mathematical physics, as founded by LaGrange and Gabrio Piola.

For this among all the other reported reasons, the committee, entrusted by the “Fondazione Levi-Civita” and the Scientific Committee of the International Research Center MEMOCS with the responsibility of awarding the International Levi-Civita Prize unanimously proposes Professor Marcelo Epstein as recipient of the 2014 edition.

Tullio Levi-Civita è stato uno dei maggiori matematici mondiali dell'ultimo secolo.

“Matematico nato, nel pieno senso della parola, egli passava senza sforzo dall'uno all'altro di campi svariati – dalla meccanica analitica all'elettromagnetismo, dalla meccanica celeste alla teoria del calore, dall'idromeccanica all'elasticità – e ovunque affrontava problemi precisi ed elevati, per lo più i problemi fondamentali caratteristici dei singoli indirizzi considerati” (U. Amaldi).