



ANNUNCIO SEMINARIO

Lumped parameters models of blood circulation: a promising method to help the clinical practice

1st Part: Lumped parameters approach: some theory

Speaker: Francesca M. Susin

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2nd Part: Lumped parameters approach: a case study

Speaker: Caterina Cara

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il 18/12/2024 - 14:30 – Aula B1 (Blocco aule sud)

Tutte le persone interessate sono invitate al seminario

Abstract: The lumped parameters or OD modelling of blood circulation is an in-silico modelling technique that allows for a simple and effective description of flow and pressure waves in any district of the cardiovascular system. The highly 3D physical mechanisms that drive blood flow in the real environment are described by OD functional elements and their corresponding functional equations and parameters. Appropriate parameters calibration hence allows for simulation of either physiological or pathological conditions. Moreover, OD reduction leads to simplified mathematics i.e., dramatically reduces computational cost. For the above reasons, OD models can be an effective tool for improving the knowledge of cardiovascular pathophysiology and predicting circulatory conditions in a patient in real time (bed-side tools).

The seminar will introduce to basic theoretical concepts of OD modelling. Moreover, its application to real scenarios will be proposed. The first case will focus on blood circulation assisted by an external mechanical pump (VA-ECMO) and highlight the pros and cons associated to the use of such a device in the clinical practice. Additionally, a preliminary evaluation of coronary circulation will be discussed, given its critical role in heart perfusion.

Francesca M. Susin is an Associate Professor at the Department of Civil, Environmental and Architectural Engineering of the University of Padova. Her research focuses on in-vitro and in-silico modelling of biological fluid flows in the human body, with attention to sex- and gender-specific effects.

Caterina Cara is a PhD Student at the School of Sciences of Civil, Environmental and Architectural Engineering at the University of Padova and a Bioengineer. Her research project is related to peripheral VA-ECMO, a device that is increasingly adopted to support patients in circulatory shock. She is developing a numerical tool aimed at assisting clinicians in optimizing the device settings and evaluating key clinical outcomes.

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