Contribution ID: **533** Type: **Poster Presentation**

Modeling contrast perfusion and adsorption in the 3D heart

Monday, 30 May 2022 15:10 (1h 10m)

This work presents a mathematical model to describe the dynamics of perfusion in cardiac tissue. The new model extends a previous one [1] and is able to reproduce clinal exams of contrast-enhanced cardiac magnetic resonance imaging (MRI) of the whole heart (3D) obtained from patients with cardiovascular diseases, such as myocardial infarct.
The new model treats the extravascular and intravascular domains as distinct porous media, where Darcy's law is adopted.
We propose reaction-diffusion-advection equations to capture the dynamics of contrast agents that are typically used in MRI perfusion exams. The identification of myocardial infarct is modeled via adsorption of the contrast on the extracellular matrix.
Different scenarios were simulated and compared to clinical images: normal perfusion; endocardial ischemia due to stenosis; and myocardial infarct. Altogether, the results obtained suggest that the models can support the process of non-invasive cardiac perfusion quantification.

[1] Simulation of the Perfusion of Contrast Agent Used in Cardiac Magnetic Resonance: A Step Toward Non-invasive Cardiac Perfusion Quantification. JR Alves, RAB de Queiroz, M Bär, RW dos Santos. Frontiers in Physiology 10. 2019

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References

Simulation of the Perfusion of Contrast Agent Used in Cardiac Magnetic Resonance: A Step Toward Non-invasive Cardiac Perfusion Quantification. JR Alves, RAB de Queiroz, M Bär, RW dos Santos. Frontiers in Physiology 10. 2019

Time Block Preference

Time Block A (09:00-12:00 CET)

Participation

In person

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Session Classification: Poster

Track Classification: (MS20) Biophysics of living porous media: theory, experiment, modeling and characterization