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HEMODYNAMICS MODELS FOR THE DESIGN OF MECHANICAL CIRCULATORY SUPPORT (MCS) TECHNOLOGIES

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R MONGRAIN[*], R LEASK* AND L PRAHL WITTBERG[†]

[*] McGill University
817 Sherbrooke St. W, Montréal, QC, Canada H3A 0C3
rosaire.mongrain@mcgill.ca, richard.leask@mcgill.ca

[†] KTH Royal Institute of Technology,
Teknikringen 8, Stockholm, Sweden
prahl@mech.kth.se

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ABSTRACT

Cardiovascular diseases remain a leading cause of death worldwide [1]. Many different Mechanical Circulatory Supports (MCSs) technologies have been developed and implemented to mitigate the diseases including catheters, canulae, stents, extracorporeal membrane oxygenation (ECMO) and ventricular assist devices (VADs), and their use is on the rise. However, blood damage remains an important issue for such devices. The main blood damage aspects are hemolysis, the release of intracellular hemoglobin from red blood cells into the extracellular plasma, and thrombosis, the formation of blood clot linked to platelets activation and aggregation. The design of MCSs includes consideration of the hemolytic and thrombotic potential of a device using different means laboratory tests, animal models and numerical simulations [2].

This mini-Symposium interests include experimental methodologies, animal protocols and data analysis and numerical models for assessing blood and tissue damage related to MCS [3]. In particular, • hemolytic and thrombotic models, • non-linear biofluid and soft tissue models (non-newtonian fluids, hyperelastic, viscoelastic solids), • diffusion and transport models, • interface models, • rupture models and • growth models from the micro- to the macro-scale.

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