Automated design and simulation workflow for an axial blood pump

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Abstract

This talk will present a collaborative effort to develop an automated and extensible workflow for the design and evaluation of an axial blood pumps. The core of the framework is a fully parametric CAD model, which is directly linked to numerical simulations, optimalization and automated report generation. Both the fully parametric CAD model and surrounding Framework was developed in-house.

The workflow is designed to enable systematic performance assessment and shape refinement, while being flexible and extensible. The long term goal is to establish a reproducible and shareable benchmark that can support future extensions, including for example the integration of advanced metrics such as blood damage prediction and thrombus formation.

Keywords: Parametric CAD design, geometrical constructions, ventricular assist device, axial blood pump, incompressible Navier-Stokes, OpenFOAM, optimalization, shape optimalization, automated design workflow, biomedical