**BLOOD RHEOLOGICAL MODELING:**

**UNCERTAINTY QUANTIFICATION OF THE REGRESSION CALIBRATED PARAMETERS**

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**ABSTRACT**

Being a complex suspension of various types of cells and proteins, blood demonstrates a profoundly non-Newtonian rheological behaviour [1]. Due to its importance in human physiology, this behaviour has been under heavy scrutiny over the last decades, resulting in the development of multiple rheological models that describe it from different aspects and to various degrees of accuracy. Despite the undeniably great effort put into developing such models, there seems to be a relatively small number of works focused on validating their ability to discriminate between healthy and pathological cases via means of sensitivity analysis (SA). This is especially true for the more complex models that encompass a large number of adjustable parameters in order to accurately depict the changes in blood shear and normal stresses as well as in viscosity under a plethora of varying conditions. Unlike simple constitutive models, whose few parameters are usually acquired directly from experimental data, the tuning of most multi-parametric differential models relies on some form of regression. While this procedure aids greatly in selecting a suitable set of parameters for the given experimental conditions, it provides no readily available information about their statistical properties (distribution shape, confidence intervals, etc.). This lack of information discourages the usage of powerful and widely available SA tools, which, no matter how sophisticated, are heavily reliant on such knowledge. In this work, we present a methodology of conducting uncertainty quantification (UQ) tasks on flows utilizing a thixo-elastoviscoplastic hemorheological model [2,3] that has been calibrated through Least-Squares Regression (LSR) on steady-state and transient experimental data of blood under different shear regimes.

**KEYWORDS:** sensitivity analysis, uncertainty quantification, hemorheology, model parameterization

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