BLOOD VISCOSITY MODELLING: INFLUENCE OF AGGREGATE NETWORK DYNAMICS UNDER TRANSIENT CONDITIONS

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This paper reports on a theoretical examination of the hypothesis that red blood cell network characteristics influence the mechanical properties of the fluid. For this purpose a newly developed energy-rate based blood viscosity model, which incorporates network dynamics, was used to predict the transient behaviour of blood viscosity (steady-state results of this model have been reported in Biorheology 46 (2009), 487-508). The main network characteristic examined in the present work was the inter-aggregate branch size and its relationship to the evolving aggregates. Branch size was used to define a network integrity index that accounted for the strength of the developed network. For the development and validation of the model, experiments performed with an optical shearing microscope, with different step-changes in shear rate, were utilised, as well as viscosity measurements under similar flow conditions performed in a double wall Couette instrument. The experimental data were compared with the response of the model, which incorporated the network integrity index. The results suggest that network characteristics may influence the viscosity of blood at low shear rates and exhibit good agreement with experimental observations **[Biorheology. 2011 Jan; 48(2):127-147]**.

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