Abstract Submitted
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A simple numerical model for membrane oxygenation of an artificial lung machine SAI NIKHIL SUBRAVETI, P.S.T. SAI, VINOD KUMAR VISWANATHAN PILLAI, B.S.V. PATNAIK, Indian Inst of Tech-Madras — Optimal design of membrane oxygenators will have far reaching ramification in the development of artificial heart-lung systems. In the present CFD study, we simulate the gas exchange between the venous blood and air that passes through the hollow fiber membranes on a benchmark device. The gas exchange between the tube side fluid and the shell side venous liquid is modeled by solving mass, momentum conservation equations. The fiber bundle was modelled as a porous block with a bundle porosity of 0.6. The resistance offered by the fiber bundle was estimated by the standard Ergun correlation. The present numerical simulations are validated against available benchmark data. The effect of bundle porosity, bundle size, Reynolds number, non-Newtonian constitutive relation, upstream velocity distribution etc. on the pressure drop, oxygen saturation levels etc. are investigated. To emulate the features of gas transfer past the alveoli, the effect of pulsatility on the membrane oxygenation is also investigated.

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