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A Homogenized Problem for a Blood Transport Through Blood Vessels

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We study the mathematical model for blood flow through vessels, which can predict deviations of geometric structure of vessels from their initial healthy state (such as aneurysms and atherosclerosis). Aneurysms may induce turbulent regime of blood flow with extra friction, which in its turn may cause the further growth of aneurysms, thus increasing the risk of rupture. A ruptured aneurysm may lead to death.

In order to predict the behavior of aneurysms, we have to compute blood flow on a large time interval. The obstacle here is pulsatility of blood flow, which significantly increases time for computing the solution of this problem. Thus, asymptotical analysis has to be applied here.

For simplicity we consider a parabolic boundary-value problem. We construct an asymptotic approximation for the solution as the time interval infinitely increases.