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Blood flow simulation on a role for red blood cells in platelet adhesion. KAZUYA SHIMIZU, Univ of Tokyo, KAZUYASU SUGIYAMA, Osaka Univ, SHU TAKAGI, Univ of Tokyo — Large-scale blood flow simulations were conducted and a role for red blood cells in platelet adhesion was discussed. The flow conditions and hematocrit values were set to the same as corresponding experiments, and the numerical results were compared with the measurements. Numerical results show the number of platelets adhered on the wall is increased with the increase in hematocrit values. The number of adhered platelets estimated from the simulation was approximately 28 (per 0.01 square millimeter per minute) for the hematocrit value of 20 %. These results agree well with the experimental results qualitatively and quantitatively, which proves the validity of the present numerical model including the interaction between fluid and many elastic bodies and the modeling of platelet adhesion. Numerical simulation also reproduces the behavior of red blood cells in the blood flow and their role in platelet adhesion. Red blood cells deform to a flat shape and move towards channel center region. In contrast, platelets are pushed out and have many chances to contact with the wall. As a result, the large number of adhered platelets is observed as hematocrit values becomes high. This result indicates the presence of red blood cells plays a crucial role in platelet adhesion.

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