

CASTS Talk

Blood cells: they either swim or are swept away by the current

2015 - 11 - 27 (Fri.)

09:20 - 12:00

308, Mathematics Research Center Building (ori. New Math. Bldg.)

The seminar will discuss modeling of blood cells (red blood cells-RBC- and leukocytes) under flow. Regarding flow of RBCs we will present three major results: (i) blood crystals (organisation of RBC in a crystalline structure under shear flow), (ii) analogy between blood flow and traffic flow, (iii) novel partition effects of hematocrit at vascular bifurcations.

Leukocyte, traditionally believed to crawl on a substratum, can swim in a very efficient way. Their swimming is qualified as amoeboid. A minimal model will be presented that captures several features of amoeboid swimming. It is found that confinement drastically affect swimming and a straight trajectory is always unstable in favor of navigation. This persistent navigation may be an indication that leukocytes have the ability of flexibly navigate through any organ without adaptations to alternating extracellular ligands, which would constitute a big constraint against an efficient immune surveillance.

Finally, it will be shown that a condition of an optimal swimming reproduces the behavior of other real swimmers (like *Eutreptiella gymnastica*).

