UNIVERSITÀ DEGLI STUDI
DI GENOVA

Thesis Project
in
Fluid Dynamics

Effects of pilose surfaces on transport/mixing in pulsatile flows

In many applications we can learn and improve existing systems by studying how similar situations have been solved in nature. A perfect example of this is found by studying surfaces on different animals such as eg. butterfly wings or shark skin. In this particular project we intend to study the effect of hair or filament on transport and mixing in so called pulsatile internal flows. Such conditions are found for example in bio-mechanical applications such as blood vessels, nasal air flow or in micro fluidic applications such as micro channels. The work will be conducted using an existing numerical code solving the underlying conservation equations for mass and momentum (Navier-Stokes equations), for incompressible Newtonian fluids, and the structure (flexible filaments with prescribed mass and bending stiffness) are modeled using an immersed boundary technique. A close collaboration will be maintained during the project with the Department of Mechanics at the Royal Institute of Technology in Stockholm, Sweden.
For further information contact Jan Pralits (DICCA): email: *jan.pralits@unige.it*, tel: 010-353 2496 or Alessandro Bottaro (DICCA) email: *alessandro.bottaro@unige.it*, tel: 010-353 2540.

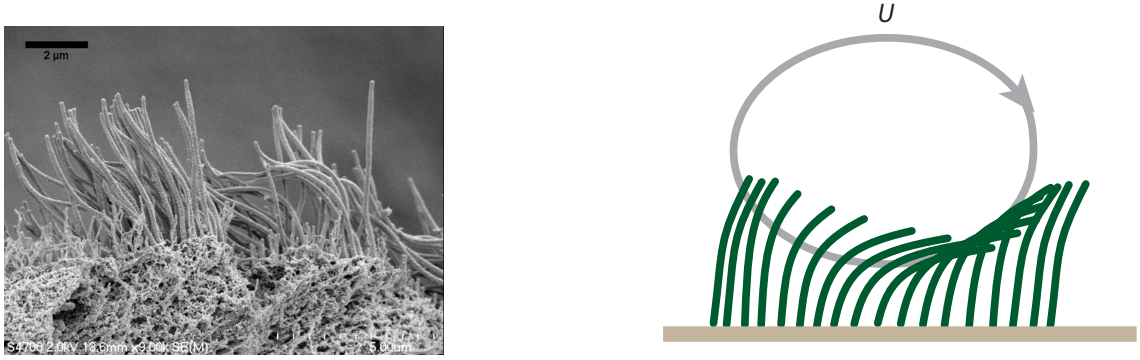

Figure 1: Scanning electron microscope images of biological cilia from an epithelial cell culture (left) and a sketch of the model (right) to be analyzed numerically and theoretically. How do the passive filaments synchronize and what is the net transport of fluid in an oscillating flow?