Computational Fluid Dynamics

Today, we focus on the big human fluid system, the air system, which consists of the lung and of course the nose. In the following simulation, we will study the behavior of the human nasal system.

Breathing / temperature distribution

Assume a cold weather outside with a temperature around the zero point. Simulate the steady state of a breathing action (for sure, this is a simplification of the problem) with a temperature dependent fluid flow simulation. A good approximation for the velocity of the air at the inlet of the nose could be 6 m/s.

Tasks

1. Import the geometry of the human nose. You can get it from the course page.
2. Simulate the air flow through the nose and compare the results between a DNS, a k-epsilon and a SST model, without temperature effects.
3. Activate the thermal energy equation and solve the temperature dependent problem.
4. Play around with different effects, pressure values and maybe time-dependent problems.

Hints

1. Define the domains of inlet, outlet and wall in the mesh tool of Ansys.
2. To get results in the lab, you should have a mesh with approx. 250,000 Elements.
3. Forget about the effects of radiation at first and use the thermal energy equation.