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Berlin oil channel

Skin friction reducing riblet surfaces consist of very small grooves with sharp ridges which have to be aligned with the mean flow. The grooves have to be designed in a way that they appear to the flow as a hydrodynamically smooth surface, i.e. they are almost completely submerged in the viscous sublayer. The skin friction reduction is achieved by decreasing the turbulent spanwise motion near the wall. The riblet surfaces developed by the DLR reduce the skin friction of turbulent flow up to 10%.

Berlin oil channel

The Berlin oil channel allows accurate measurements of the skin friction for smooth and structured surfaces. For that reason a differential force balance was designed that gives high measurement accuracy. By using white oil as working fluid, the structures under investigation (e.g. riblet surfaces) can be enlarged by a factor of about one hundred compared to experiments in air or water. The channel is driven by two ship propellers which permit flow velocities between $v=0.3 ... 1.3 m/s$. In the test section a fully developed turbulent channel flow is obtained. The Reynolds number for this channel calculated with the channel width 0.25 m, the mean velocity and the cinematic viscosity $\nu=11.5*10^{-6}m^2/s$ ranges from Re = 8000 to Re = 33000.

The test facility offers the possibility to investigate the drag properties for surfaces with technical roughness and can thus help minimize manufacturing costs. This is particularly interesting for the production of turbo-machine blades or test models used in wind tunnels, where the surface quality is of great importance.

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