DEVELOPING A DIGITAL MODELING TOOL TO OPTIMIZE PERFORMANCE BY TESTING DIFFERENT GEOMETRIES

COMPUTATIONAL FLUID AND STRUCTURAL DYNAMICS (CFSD)

How do wind and waves influence the performance of a boat? How can a cyclist’s position be optimized to reduce wind resistance?

Until recently, the most effective way of testing how a piece of equipment performed was by putting it in a realistic situation, such as a wind tunnel or a towing tank. Today, cheaper digital methods are used to model aerodynamics and hydrodynamics. The Computational Fluid and Structural Dynamics (CFSD) laboratory take a mathematical approach to the matter. It is able to simulate a wide range of flows using a mathematical model of the object, factoring in the way it deforms and moves.

EPFL’s Chair of Modeling and Scientific Computing (CMCS), in conjunction with the mathematics department of the Politecnico di Milano, is working to refine this approach. Researchers are studying and developing new approaches allowing them to test, with limited calculation resources, a maximum number of geometries in a short space of time so that engineers can choose the most suitable solution for their problem.