

Key Characteristics: sail shape and sail force measurements • battens deformation • flying shape

Derive the force of a sail just from images

Sails are the engines of a yacht. The existence of a correlation between the shape of sails and the force produced by these has been known for a long time.

Traditionally, the only tools available to sail-makers and sailors to maximise the performance of a sail were just their experience and sensitiveness. In the last century and a half, with the increasing interest in regattas, new tools to achieve better performance from the sail plan were developed. However, knowing the force produced by the sail is still a challenge. Until now, four main methods have been used, but all of them require expensive and complex instrumentation. The aim of this project is to develop an easy and economical system to estimate the force produced by the sails, that could be

used both on small dinghies and maxi yachts. The use of full battened mainsails is a growing technology in sailing. The idea is to relate the deformation of these battens (that are basically simple beams) to the force that produces the deformation. The deformed shape of the sail will be captured using DIC (Digital Image Correlation). Knowing the properties of the battens will then be possible to write a code that in real time will relate the deformation on the same battens to the force producing this deformation.

This will avoid the use of complex theories related to the structural behaviour of membrane. The system will be tested on a mainsail of a F18 Catamaran at full scale and will be validated using Computational Fluid Dynamics (CFD) •

