

Sail dynamics during tacking manoeuvres

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We explore how flexible sails behave during a tacking maneuver—when a sail turns into the wind to achieve upwind sailing. Sometimes the sail successfully flips into its mirror-image shape; other times, it gets stuck close to its initial shape, unable to flip. We investigate what determines a successful flip and how long it takes, focusing on both the sail's material properties and how the manoeuvre is executed. In the talk, we will show that stiffness, tension, and final sail angle to the wind play the biggest roles in whether the flip happens at all, while the sail's mass and the speed and acceleration of the turn mostly affect how fast the flipping happens. We will also see that slack sails are harder to flip during tacking.