Stabilizing Rowing Boats: Equilibrium Rigging Design

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Abstract

To mitigate the persistent lateral oscillation of a rowing boat, various asymmetric rig designs have been implemented, even in Olympic competitions. Previous theoretical studies have operated under the unrealistic assumption that all rowers possess identical strength. This paper advances previous findings by scrutinizing the scenario where rowers exhibit heterogeneous strengths. Our study unveils a novel rig design feature: among the four designs for an eight-rower boat proposed by Barrow (2010), the design “uddu duud” uniquely satisfies the equilibrium condition for angular moments. This design is different from the German rig, “udud dudu,” utilized by Team Canada to win the Men’s Eight at the 2008 Summer Olympics. Furthermore, we enhance the analysis by incorporating stochastic noises.

Keywords: Rowing stability, angular momentum, the Prouhet-Tarry-Escott Problem