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**Suppressing flow separation over a flat plate using machine learning** AMIRKHOSRO KAZEMI, Florida Atlantic University, PAUL ROUSSEAU, cole Nationale Suprieure de Mcanique et D'arotechnique, DANIEL GOMEZ, Universidad Ana G. Mendez, AISHWARYA SURESHKUMAR NAIR, Florida Atlantic University, LUCIANO CASTILLO, Purdue University, SIDDHARTHA VERMA, OSCAR M. CURET, Florida Atlantic University — Suppressing flow separation in wall-bounded flows is essential for drag reduction and consequently decreases fuel consumption, pollutant emissions, the noise of aerial and marine vehicles and affects seawall erosion. There are many mechanisms to delay flow separation, however, achieving it with minimal energy expenditure remains a challenge. Thus, it is paramount to understand how to delay the onset of transition in the presence of small disturbances. In a series of experiments, we implemented multiple cylindrical roughnesses on a flat plate to induce flow separation. In addition, we examined the effects of the roughness on the development of the boundary layer using particle image velocimetry, soap film setup as well as numerical simulations. A linear actuator is used to modulate the near-wall structure and measure the resulting change in the friction coefficient. This data is incorporated with a reinforcement-learning algorithm in order to reduce drag by delaying flow separation.

Amirkhosro Kazemi
Florida Atlantic University

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