

Abstract Submitted  
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**Transition delay by means of a passive mechanism**<sup>1</sup> JENS H.M. FRANSSON, ALESSANDRO TALAMELLI, LUCA BRANDT, KTH Mechanics, SE-100 44 Stockholm, CARLO COSSU, LadHyX, CNRS Ecole Polytechnique, F-91128 Palaiseau — Reducing the skin friction is important in nature and in many technological applications when larger speeds or lower energy consumptions are sought for. This reduction may be achieved by reducing stresses in turbulent boundary layers for instance tailoring biomimetic rough skins. Here we take a second approach consisting in keeping the boundary layer laminar as long as possible<sup>2</sup>. We report the results of wind-tunnel experiments, motivated by previous theoretical analyses<sup>3,4</sup> in which a well controlled spanwise periodic modulation of the boundary layer thickness is induced by using suitably designed<sup>5,6</sup> roughness elements placed on the skin. We show, both with smoke visualization and measurements, that using this passive control technique it is possible to sensibly delay transition to turbulence.

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<sup>2</sup>Joslin, R. D. 1998 *Annu. Rev. Fluid Mech.* **30**, 1–29

<sup>3</sup>Cossu & Brandt 2002 *Phys. Fluids* **14**, L57–L60.

<sup>4</sup>Cossu & Brandt 2004 *Eur. J. Mech./B Fluids* **23**, 815–833.

<sup>5</sup>Fransson, Brandt, Talamelli & Cossu 2004 *Phys. Fluids* **16**, 3627–3638.

<sup>6</sup>Fransson, Brandt, Talamelli & Cossu 2005 *Phys. Fluids* **17**, 054110.

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