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Direct numerical simulation of flow past superhydrophobic surfaces PAOLO LUCHINI, Universita‘ di Salerno - DIIN, ALESSANDRO BOTTARO, Universita‘ di Genova - DICCA — Superhydrophobic surfaces trap a discontinuous air layer through their texture which, in addition to changing the apparent contact angle of water drops, also changes the friction coefficient of a continuous water flow. Locally this effect can be represented through a slip coefficient (*e.g.* Lauga & Stone, *J. Fluid Mech.* 489, 55–77, 2003), or equivalently through an effective displacement of the wall by a distance (different for each different velocity component) comparable to the spacing of the texture. For this reason they are being considered for drag reduction in turbulent flow, more sensitive to this displacement than laminar flow for its intrisic small features. Since the upper limit on texture size imposed by the destruction of the surface-tension-bound air layer eventually constrains the reduction available, to quantify the effect accurately is essential. In its simplest representation, the superhydrophobic surface may be assumed to be flat and composed of alternating patches of no-slip and free-slip wall. Here direct numerical simulations will be presented of turbulent flow past such a surface, and their results compared with those produced by the corresponding effective wall displacement.

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