Could tailored golf balls improve putting performance?

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Golfers could get tailored golf balls with more precise separation control for the best performance, new research suggests.

Elements such as trip wires, dimples and sand-grain roughness on the surface of a body have been shown to be effective in reducing drag on objects such as golf balls, which helps them fly farther.

Dimples make up the small round indentations on the golf ball. They energize the flow and induce turbulence in the layer of air next to the ball. This turbulent boundary layer can reduce drag.

The study, published in *Journal of Turbulence*, provides new insights into how the momentum transport is affected by the dimples and how multiple dimple rows interact to generate near wall turbulence.

Co-author Nikolaos Beratlis explains: "To most golfers the fact that a golf ball with a roughened surface can give you 150 yards more than a perfectly smooth one sounds like a paradox." He adds: "This additional momentum that dimples give keeps the flow attached to the surface longer reducing the pressure difference between the front and back of the golf ball, thus resulting in less drag. "

Results showed that the presence of the dimples triggers instabilities that cause significant momentum transport.

"These results provide guidelines for more precise separation control,

which will help us tailor golf balls to individual golfers for best performance," Nikolaos Beratlis added.

The researchers used a series of direct numerical simulations of the flow past a flat plate with two and eight rows of dimples in a staggered arrangement.

More information: "Effects of dimples on laminar boundary layers", by N. Beratlis, E. Balaras & K. Squires, *Journal of Turbulence*. DOI: 10.1080/14685248.2014.91827