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**Switchable and Tunable Aerodynamic Drag on Cylinders** MARK GUTTAG, FRANCISCO LOPZ JIMNEZ, MIT, PRIYANK UPADHYAYA, SHANMUGAM KUMAR, Masdar Institute, PEDRO REIS, MIT — We report results on the performance of Smart Morphable Surfaces (Smporhs) that can be mounted onto cylindrical structures to actively reduce their aerodynamic drag. Our system comprises of an elastomeric thin shell with a series of carefully designed subsurface cavities that, once depressurized, lead to a dramatic deformation of the surface topography, on demand. Our design is inspired by the morphology of the giant cactus (*Carnegiea gigantea*) which possesses an array of axial grooves, thought to help reduce aerodynamic drag, thereby enhancing the structural robustness of the plant under wind loading. We perform systematic wind tunnel tests on cylinders covered with our Smorphs and characterize their aerodynamic performance. The switchable and tunable nature of our system offers substantial advantages for aerodynamic performance when compared to static topographies, due to their operation over a wider range of flow conditions.

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