

Abstract Submitted  
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**Do ribs help succulents to cope with aerodynamic loads in their natural environment?**<sup>1</sup> OLEKSANDR ZHDANOV, ANGELA BUSSE, University of Glasgow — Ribs on cacti stems play an important role for their survival not only in terms of water storage and evaporation control but also in attenuating high wind loads. Studies of flow past circular cylinders with many ribs inspired by the Saguaro cactus, which is native to the North American deserts, showed a reduction in drag and amplitude of unsteady force fluctuations compared to the smooth circular cylinder. In the Eastern Hemisphere some succulents have independently developed a similar plant structure as cacti but with a low number of ribs. If aerodynamics is one of the driving factors behind this convergent evolution, shapes with a low number of ribs should show similar benefits. In the present work, we experimentally investigated the aerodynamics of a cylinder with four ribs inspired by the succulent *Euphorbia Abyssinica*. As its outer shape is approximately square, i.e. non-circular, the aerodynamic coefficients show a strong dependence on its orientation with respect to the mean flow. The experimental results are compared to the square cylinder at the same angular orientations and to results obtained from large-eddy simulations. The optimal orientation of this shape where aerodynamic loads are minimised is also discussed.

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Oleksandr Zhdanov  
University of Glasgow

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