

Abstract Submitted
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Experiments on Washboard Road STEPHEN MORRIS, University of Toronto, NICOLAS TABERLET, JAMES MCELWAIN, STUART DALZIEL, DAMTP, Cambridge University — Granular surfaces to develop lateral ripples (so-called “washboard” or “corrugated” road) under the action of rolling wheels. Similar ripples are observed on railroad tracks and many other rolling, load bearing surfaces. Our aim was to investigate this instability of the flat road surface from the point of view of driven, dissipative granular dynamics. We report the results of both laboratory experiments and soft-particle direct numerical simulations. The experiment consisted of a rotating table 60 cm in radius with a thick layer of sand forming a roadbed around the circumference. A 6 cm radius hard rubber wheel, with a support stationary in the lab frame, rolled on the sand layer. We varied the speed of the table, the details of the grains and the suspension of the wheel. The ripple pattern appears as small patches of travelling waves which eventually spread to the entire circumference. The ripples drift slowly in the driving direction. Interesting secondary dynamics of the saturated ripples were observed, as well as various ripple creation and destruction events. The wavelength of the ripples can be quantized by the finite circumference of the road. All of these effects are captured qualitatively by 2D soft particle simulations in which a disk rolls over a 2D bed of polydisperse particles in a periodic box.

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