

## The Motion of Dunes

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Dunes are aerodynamic instabilities that exist in deserts and along coasts. I will present the first set of equations of motions that correctly describes the evolution of a free granular surface under the action of wind and gravity. These equations do indeed reproduce measured dunes quantitatively as has been verified in Marocco and Brazil. The collision of dunes can show solitary wave character or breeding of baby dunes. One can understand the genesis of dune fields as a sequence of instabilities. Adding a further equation for vegetation growth one can study dune fixation and the transition to parabolic dunes. It is also possible to reproduce dunes on Mars explaining their strange shape and getting insight about the local saltation process. Saltation transport can also be simulated on a granular scale obtaining quantitative expressions for the saturation dynamics.