

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

The Elastochrone: the descent time of a sphere on a flexible beam

JEFFREY ARISTOFF, Dept. of Mathematics, MIT, CHRISTOPHE CLANET, Dept. of Mechanics, Ecole Polytechnique, JOHN BUSH, Dept. of Mathematics, MIT — We present the results of a combined experimental and theoretical investigation of the motion of a sphere on an inclined flexible beam. A theoretical model is developed to describe the dynamics, and in the limit where the beam reacts instantaneously to the loading, we obtain exact solutions for the load trajectory and descent time. For the case of an initially horizontal beam, we calculate the period of the resulting oscillations. Theoretical predictions compare favorably with our experimental observations in this quasi-static regime. The time taken for descent along an elastic beam, the elastochrone, is compared to the classical brachistochrone, the shortest time between two points in a gravitational field.

Jeffrey Aristoff
Dept. of Mathematics, MIT

Date submitted: 14 Nov 2008

Electronic form version 1.4