

1125-70-2066

Xiaolin Wang* (wxiaolin@umich.edu), 530 Church St., Department of mathematics, Ann Arbor, MI 48109, and **Silas Alben** (alben@umich.edu), 530 Church St, Department of mathematics, Ann Arbor, MI 48109. *Dynamics and locomotion of flexible foils in a frictional medium.*

Flexible beams with Coulomb friction force can be applied to model the locomotion of footless animals like snakes. The lack of limbs distinguishes their kinematics from other common modes of locomotion including flying and swimming, and exhibits unique dynamic behaviors. In this work, we study a nonlinear beam under frictional forces, driven by periodic base excitations. We consider the cases where the base is fixed and free to translate. The key control parameters are the excitation amplitude, beam rigidity, and frictional coefficients. We study dynamical phenomena including resonances and multiply-periodic states for the fixed base, and the speed and efficiency of locomotion for the freely translating base. Numerical simulations and linearized models are used to explain the dynamic behaviors. (Received September 19, 2016)