Hydrodynamics of self-propelled hard particles. APARNA BASKARAN, Physics Department, Syracuse University, Syracuse, NY 13244, CRISTINA MARCHETTI, Physics Department, Syracuse University, Syracuse, NY 13244 — Motivated by recent simulations and by experiments on aggregation of gliding bacteria, we study a physical model of the collective dynamics of self-propelled hard particles on a substrate in two dimensions. The particles have finite size, interact via excluded volume and are frictionally damped by the interaction with the substrate. Starting from a microscopic model of dynamics that includes non-thermal noise sources, we derive a continuum description of the system. The hydrodynamic equations are then used to characterize the possible steady states as a function of the particles’ packing fraction and examine their stability. Research support by the NSF award number DMR-0305407.