Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

**Viscous constraints on predator:food size ratios in microscale feeding** MEHDI JABBARZADEH, HENRY FU, University of Nevada, Reno — Small organisms such as protists or copepods may try to capture food by manipulating food with cilia, limbs, or feeding appendages. At these small scales, viscous flow may complicate the ability of a feeding appendage to closely approach a food particle. As a simplified but tractable model of such feeding approach, we consider the problem of two spheres approaching in a Stokes fluid. The first "feeding" sphere, which represents a body part or feeding appendage, is pushed with a constant force towards a force-free "food" sphere. When the feeding sphere reaches within a cutoff distance of the food sphere we assume that nonhydrodynamic interactions lead to capture. We examine approach for a range of size ratios between the feeding and food sphere. To investigate the approach efficiency, we examine the time required for the feeding sphere to capture the food sphere, as well as how far the feeding sphere must move before it captures the food sphere. We also examine the effect of varying the cutoff distance for capture. We find that hydrodynamic interactions strongly affect the results when the size of the spheres is comparable. We describe what relative sizes between feeding sphere and food particles may be most effective for food capture.

Mehdi Jabbarzadeh
University of Nevada, Reno

Date submitted: 25 Jul 2014 Electronic form version 1.4