MAE 171B Project Proposal: **Elastic Swimming**

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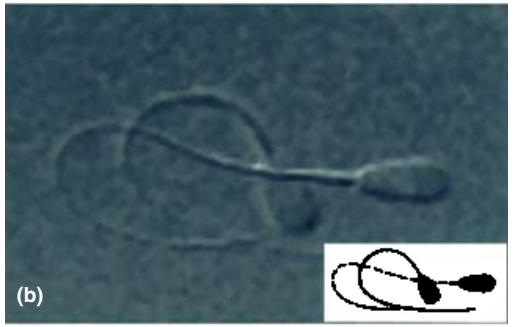
Motivation

- Most biological problems in reproduction involve the locomotion of spermatozoa in mucus (an elastic fluid, therefore a non-Newtonian fluid) (see picture on the right).
- Almost nothing is know about the general principles of locomotion in elastic fluids.
- Challenge: design a simple mechanical swimmer which exploit the elastic properties of the fluid to move



Objective

- Design a small device (a few centimeters) which can move in an elastic fluid using self-contained actuation.
- The device is composed of two solid bodies of different shapes (e.g. a hemisphere and a cone) which rotate relative to one another.
- It is immersed in an elastic fluid (e.g. a polymeric solution) and the relative rotation of the two bodies leads to locomotion. [if the fluid is replaced by a Newtonian fluid, such device should <u>not</u> be able to move, demonstrating therefore that it is a purely <u>elastic swimmer</u>].