

Title: Physics in Nature Presentation: How Sea Animals Use Hydrodynamics to their Advantage

Date: Aug 19, 2011 12:00 PM

URL: <http://pirsa.org/11080093>

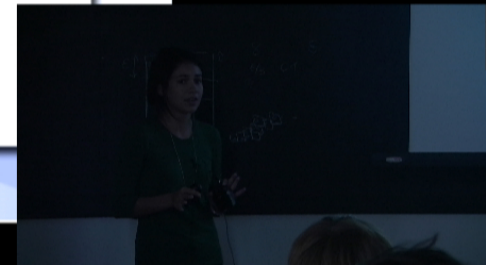
Abstract:

# Motivation

- ✓ Man-made designs
  - ✓ Boats, torpedoes, under-water robotics, high-performance swimming attire
- ✓ Personal curiosity

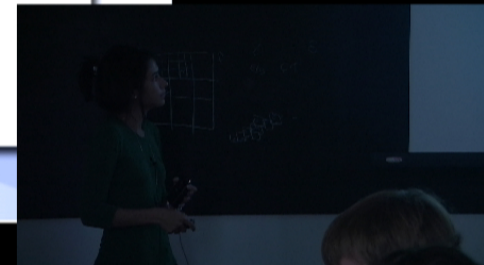


# How Do Fish Swim?



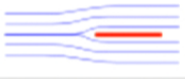
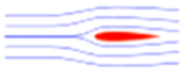
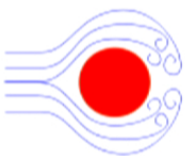
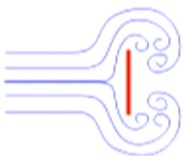
# Definitions

- ✓ **Streamline**
  - ✓ Design that offers the least resistance to fluid flow
- ✓ **Aspect ratio**
  - ✓ A ratio used to predict efficiencies of control surfaces through fluids
- ✓ **Leading edge**
  - ✓ The foremost edge of an airfoil or fin



# Overcoming Drag Forces

- ✓ Friction Drag
  - ✓ Drag between the fish and the boundary layer
  - ✓ Slime coat
- ✓ Form Drag
  - ✓ Force required to push water aside
  - ✓ Streamline body

Shape and flow	Form drag	Skin friction
	0%	100%
	~10%	~90%
	~90%	~10%
	100%	0%

