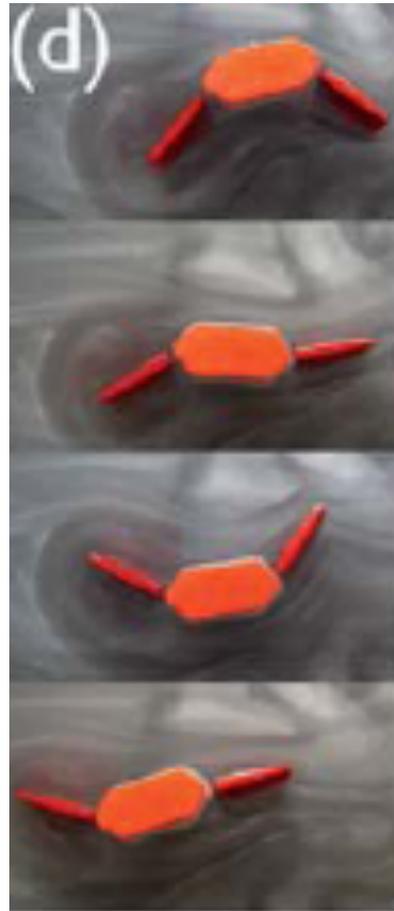


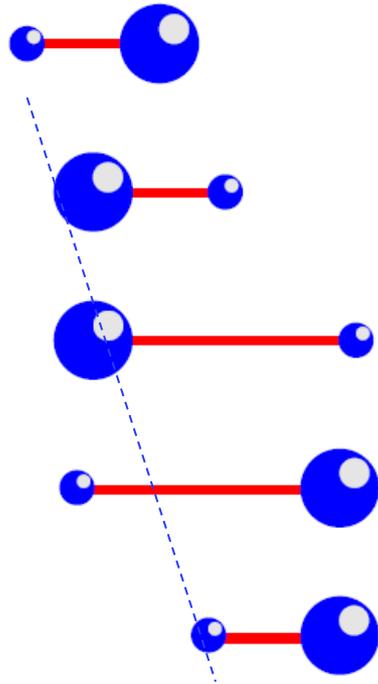
Projet Homofaber
Conception d'un micronageur
Push-me Pull-you
(4 étudiants)

Théorème de la coquille St-Jacques

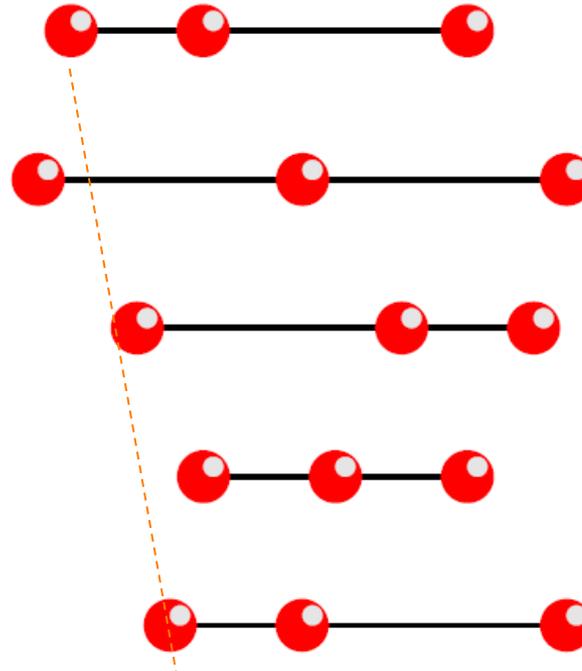


A $Re=0$, toute technique nage “réversible”
produit une vitesse de nage nulle!

Deux concepts théoriques



Pousse-moi-tire-toi
(Pushmepullyou)



Nageur a 3 spheres

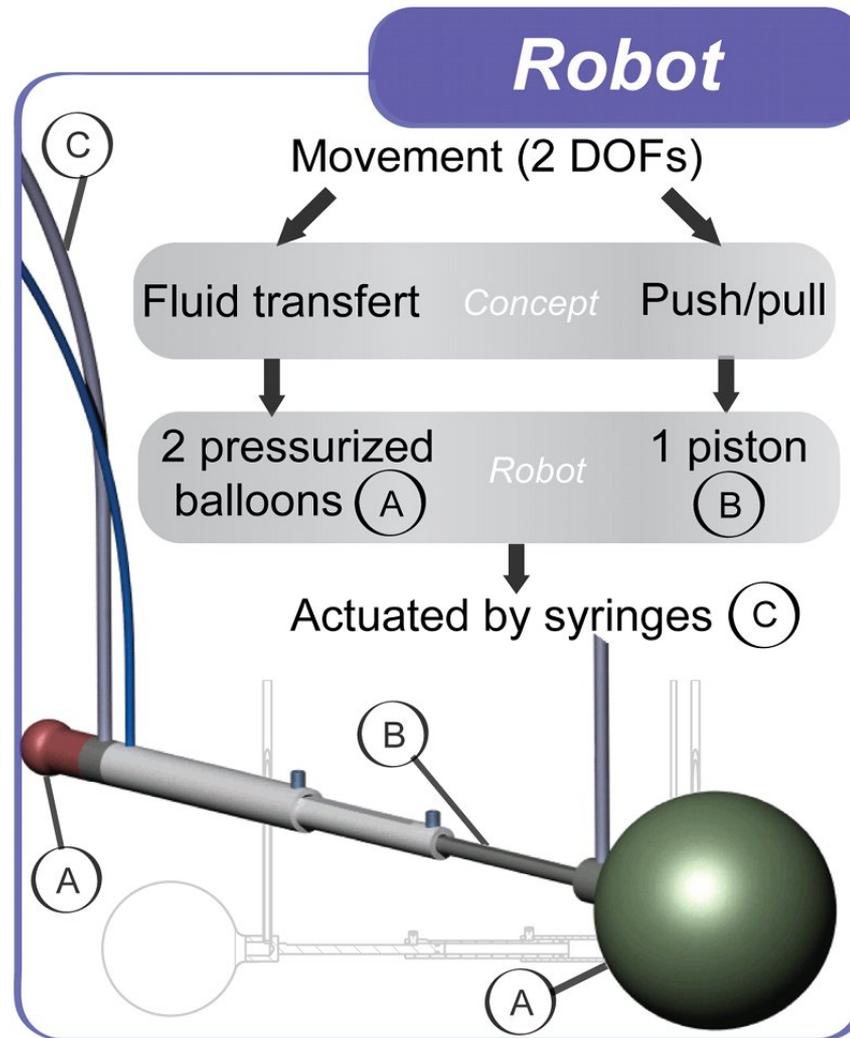
J. E. Avron, O. Kenneth, and D. H. Oaknin, "Pushmepullyou: An efficient micro-swimmer," *New J. Phys.* 7, 234 2005

Swimming gait of Euglena



<http://www.youtube.com/watch?v=fI7nEWUjk3A>

Realisations précédentes



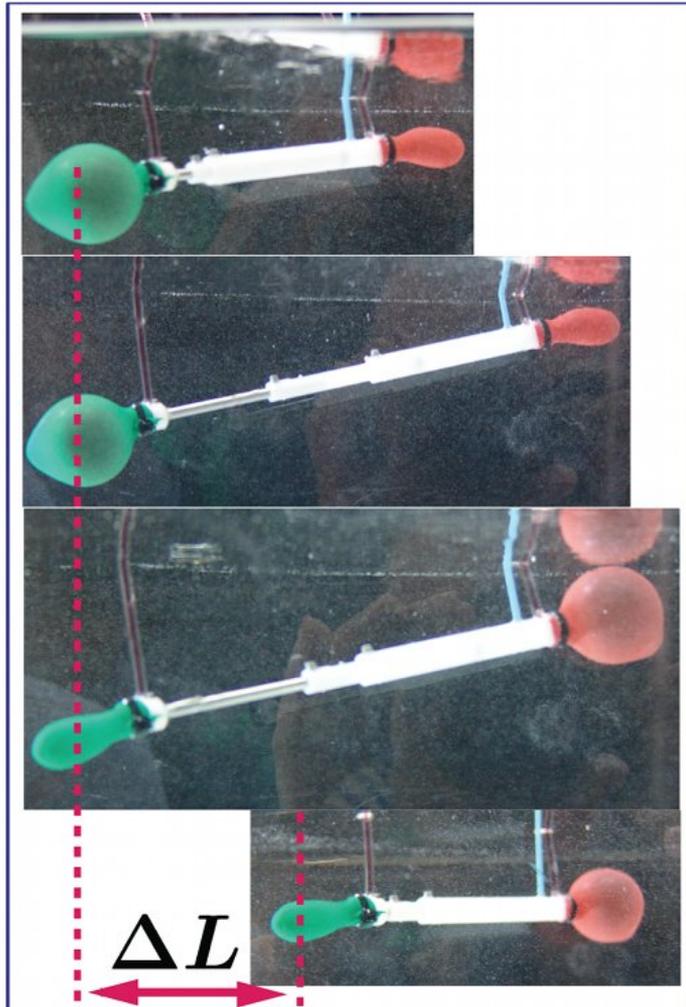
Robot dimensions :

Piston length
92 to 173 mm

Ballons radius
5 to 20 mm

Test conditions :

Fluid: Glycerin
at 10°C



Using highly viscous glycerin, low Reynolds number conditions could be achieved

$$Re = 10^{-2}$$

Giving an average displacement of

$$\Delta L = 54 \text{ mm per cycle}$$

➡ show good agreement with analytical and numerical predictions

Experimental

Traînée importante des tuyaux d'alimentation!

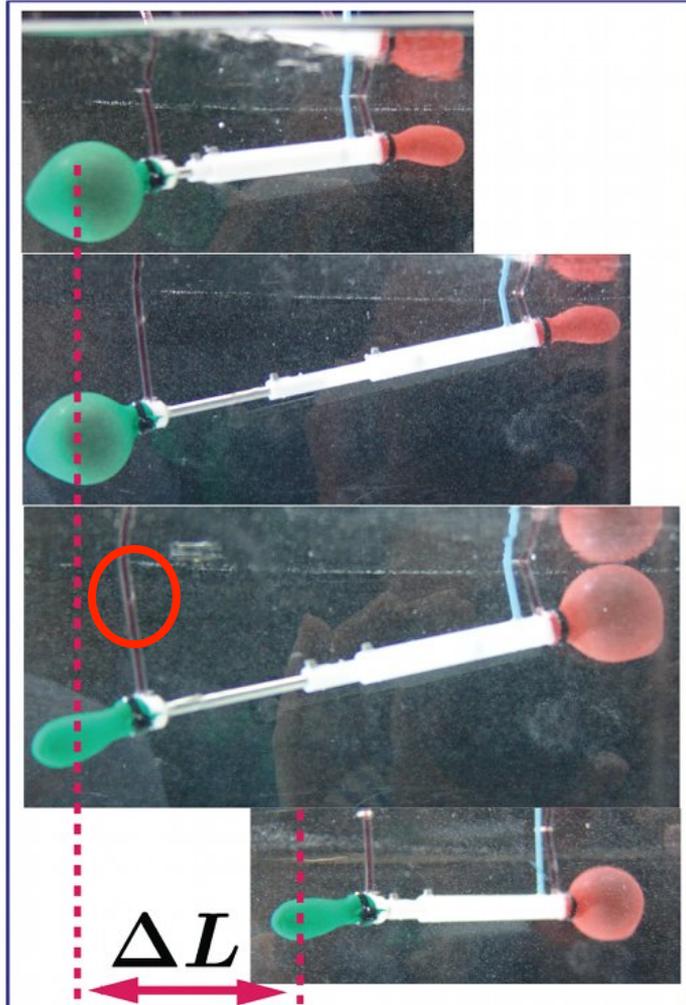
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Using highly viscous glycerin, low Reynolds number conditions could be achieved

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Giving an average displacement of

$$\Delta L = 54 \text{ mm per cycle}$$

➡ show good agreement with analytical and numerical predictions

Experimental

Objectifs

- Réaliser un robot centimétrique **autonome**
- Utilisation de géométries déployables



Push

Deflate

P. Reis, MIT