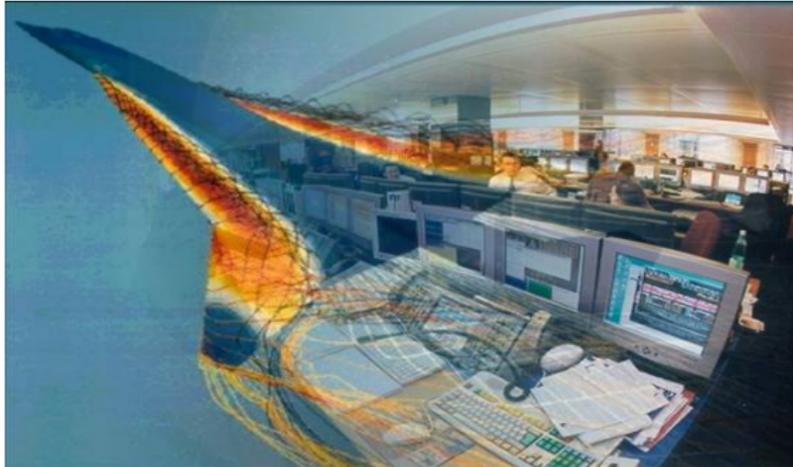


Projets S8



March 1, 2020

- ▶ Valeurs propres du Laplacien (F. Couvelier)

$$-\Delta u + ku = 0$$



<https://www.youtube.com/watch?v=6kLmlbkWJZ8>

► Milieux poreux (M. Kern)

$$\text{div}(K\nabla p) = f$$

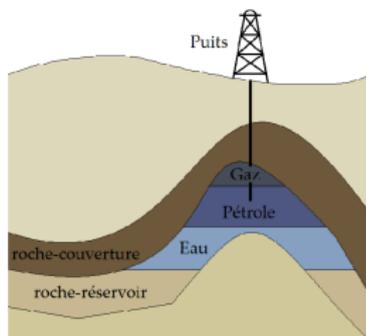
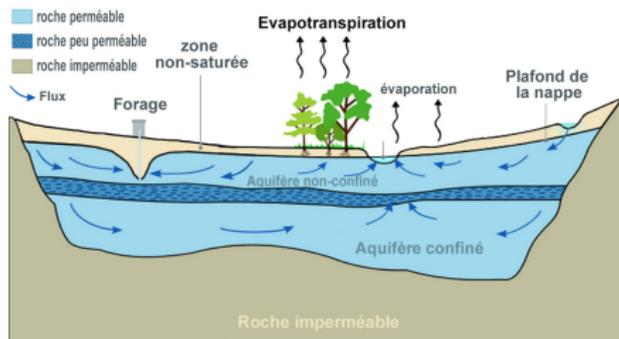
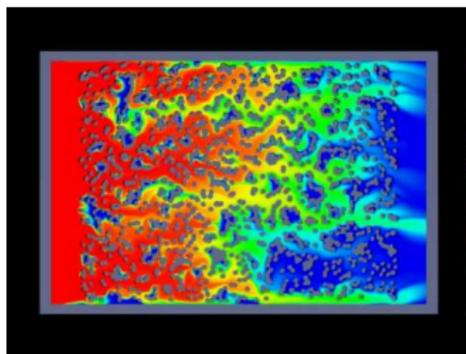


FIGURE 1.1 – Schéma d'un réservoir avec piège anticlinal



- ▶ Transport en deux dimensions (E. Audusse)

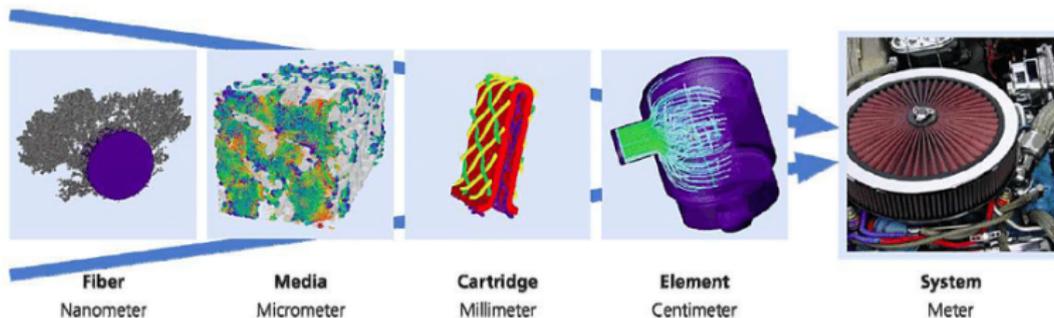
$$\partial_t c + \mathbf{u} \cdot \nabla c = 0$$



<https://www.youtube.com/watch?v=QGGBomi5ujs>

- ▶ Ecoulements multi-echelles (P. Omnes)

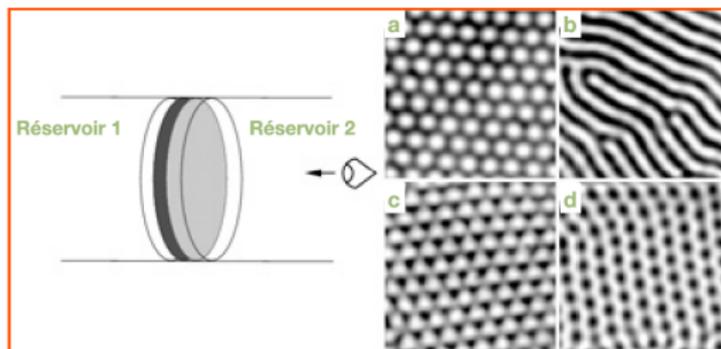
$$\mathbf{u}(x, x/\epsilon) \cdot \nabla c - \nu(x, x/\epsilon) \Delta c = 0$$



► Instabilités Turing (N. Vauchelet)

$$\partial_t u - \nu_u \Delta u = u^2 v - Au$$

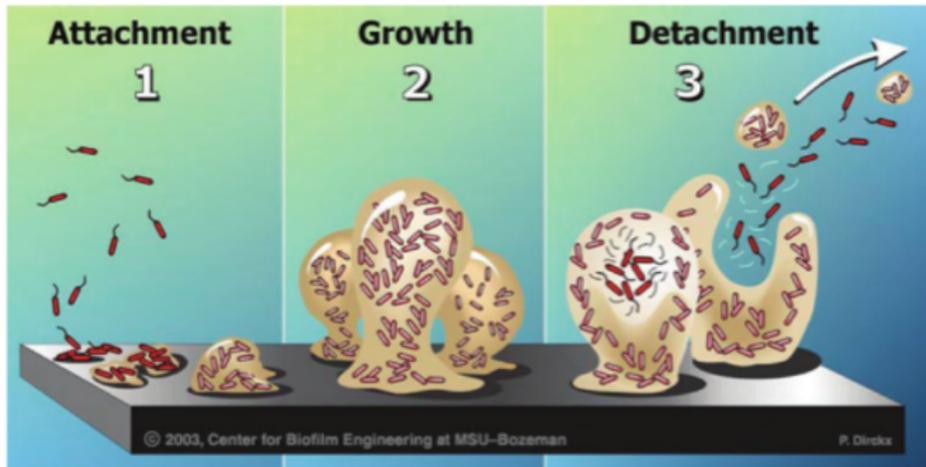
$$\partial_t v - \nu_v \Delta v = -u^2 v + B(1 - v)$$



- Développement d'un biofilm (L. El Alaoui)

$$\partial_t c + \mathbf{u} \cdot \nabla c = g(c, S) - l(c, S)$$

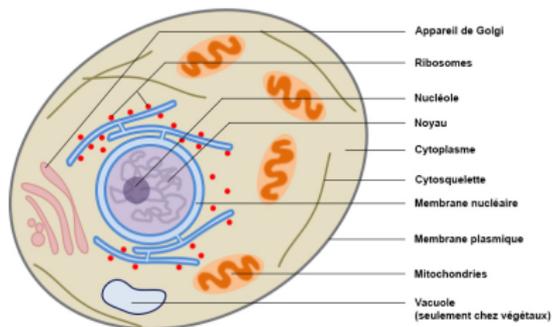
$$\partial_t S - \nu \Delta S = -g(c, S)$$



► Potentiel intracellulaire (O. Lafitte)

$$-\Delta u = f$$

La cellule eucaryote Schéma simplifié



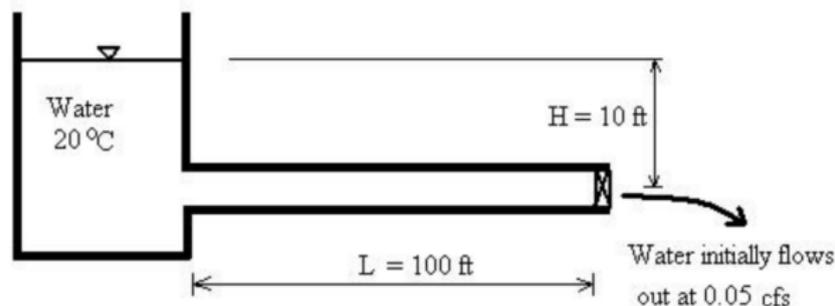
Un schéma eBiologie.fr

Le domaine Ω varie avec le temps et contient des inclusions de conductivité différente

- ▶ Etude du coup de bélier dans des écoulements en conduite (F. Benkhaldoun)

$$\partial_t H + \alpha \partial_x Q = 0$$

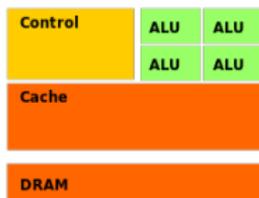
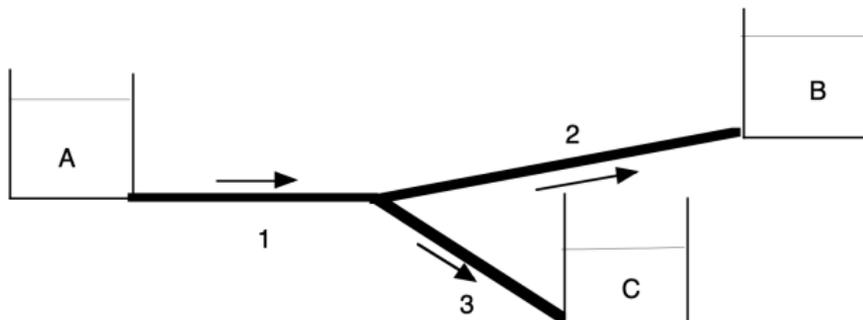
$$\partial_t Q + \beta \partial_x H = f(Q)$$



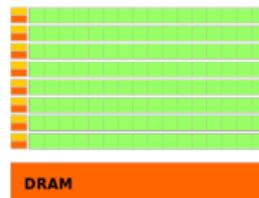
L'effet coup de bélier apparait quand on ferme brutalement la vanne à la sortie du conduit.

Les projets

- ▶ Code GPU pour les écoulements dans un réseau de conduites (F. Benkhaldoun)



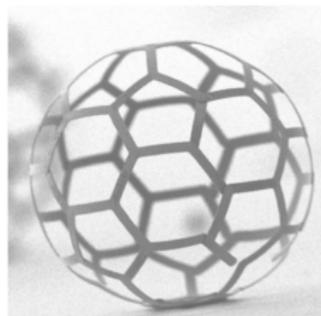
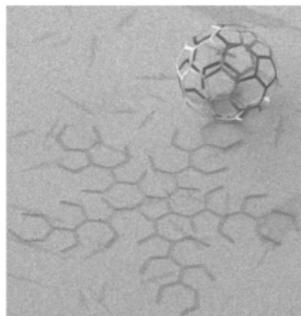
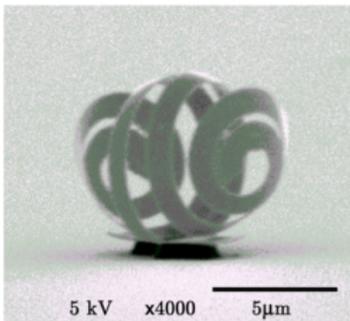
CPU



GPU

- ▶ Déformation de nano-structures (I. Ionescu)

$$\operatorname{div} \sigma = f$$



► Décomposition de domaines (E. Audusse)

