

# Mobilité dans les milieux granulaires

Baptiste Darbois Texier

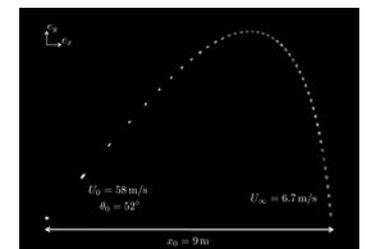
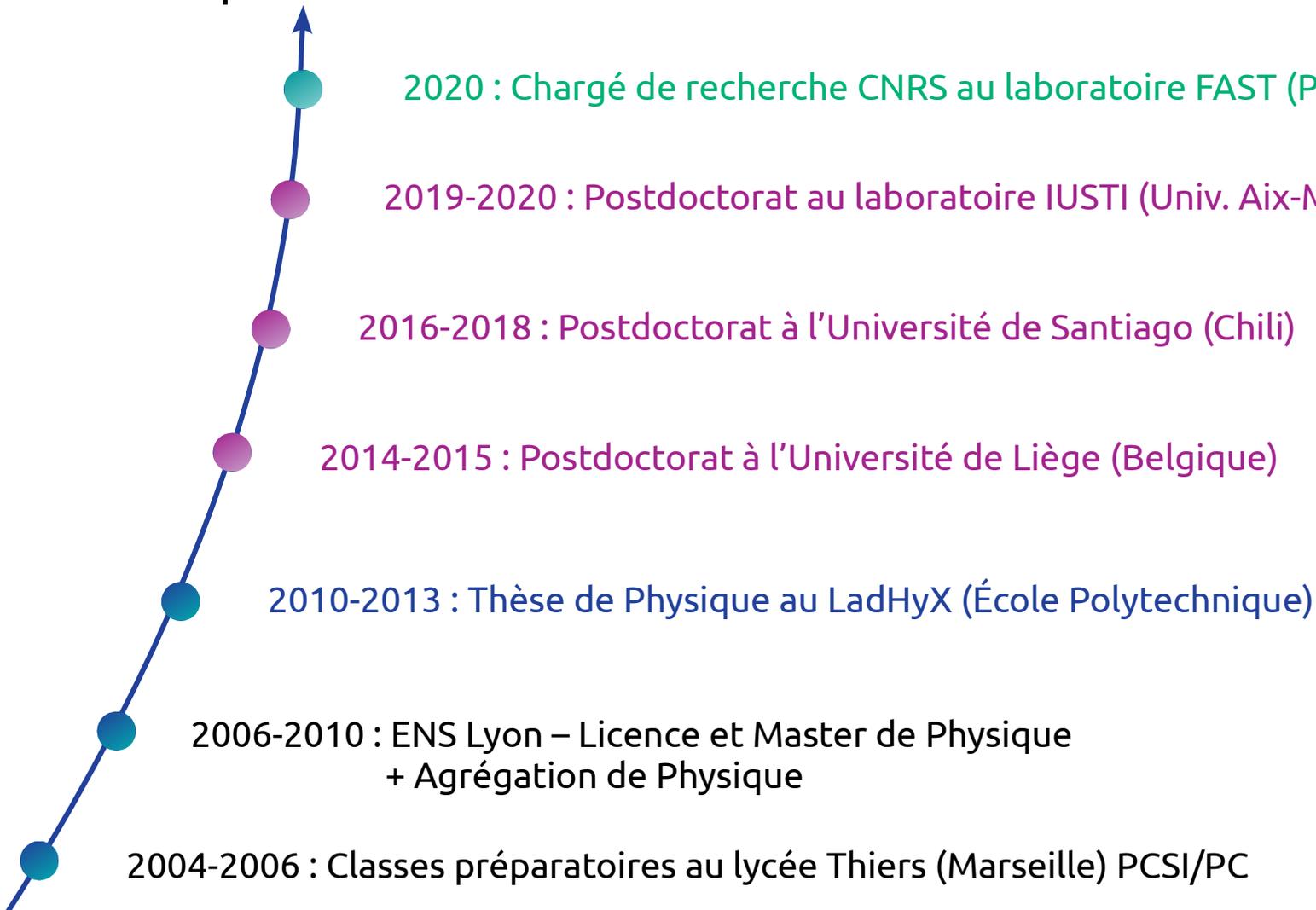


Colloque Alain Bouyssy - 16 décembre 2021

université  
PARIS-SACLAY



# Parcours personnel



Milieux granulaires



## Comment se déplacer dans les milieux granulaires ?

En surface



Lutte contre la désertification



Exploration spatiale

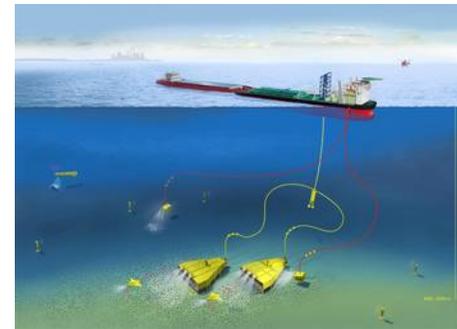
Sous la surface



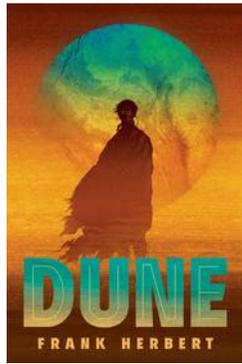
Monitoring des silos



Missions de secours dans les débris



Exploration des fonds marins



## Lézard des sables – *Sincus scincus*



Maladen, R. D., Ding, Y., Li, C., & Goldman, D. I. (2009) *Science*

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Maladen, R. D., Ding, Y., Li, C., & Goldman, D. I. (2009) Science

## Sand southern octopus

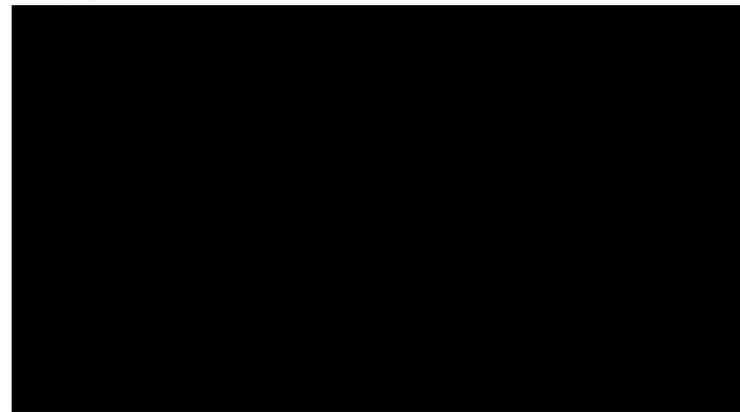
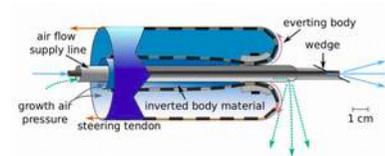


## Lézard des sables – *Sincus scincus*

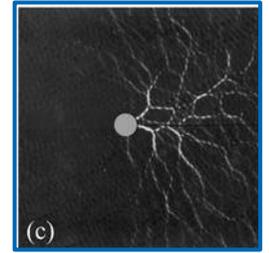
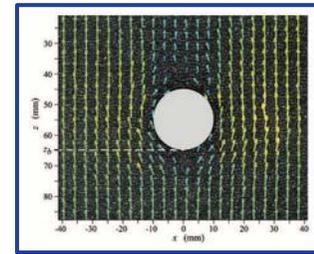
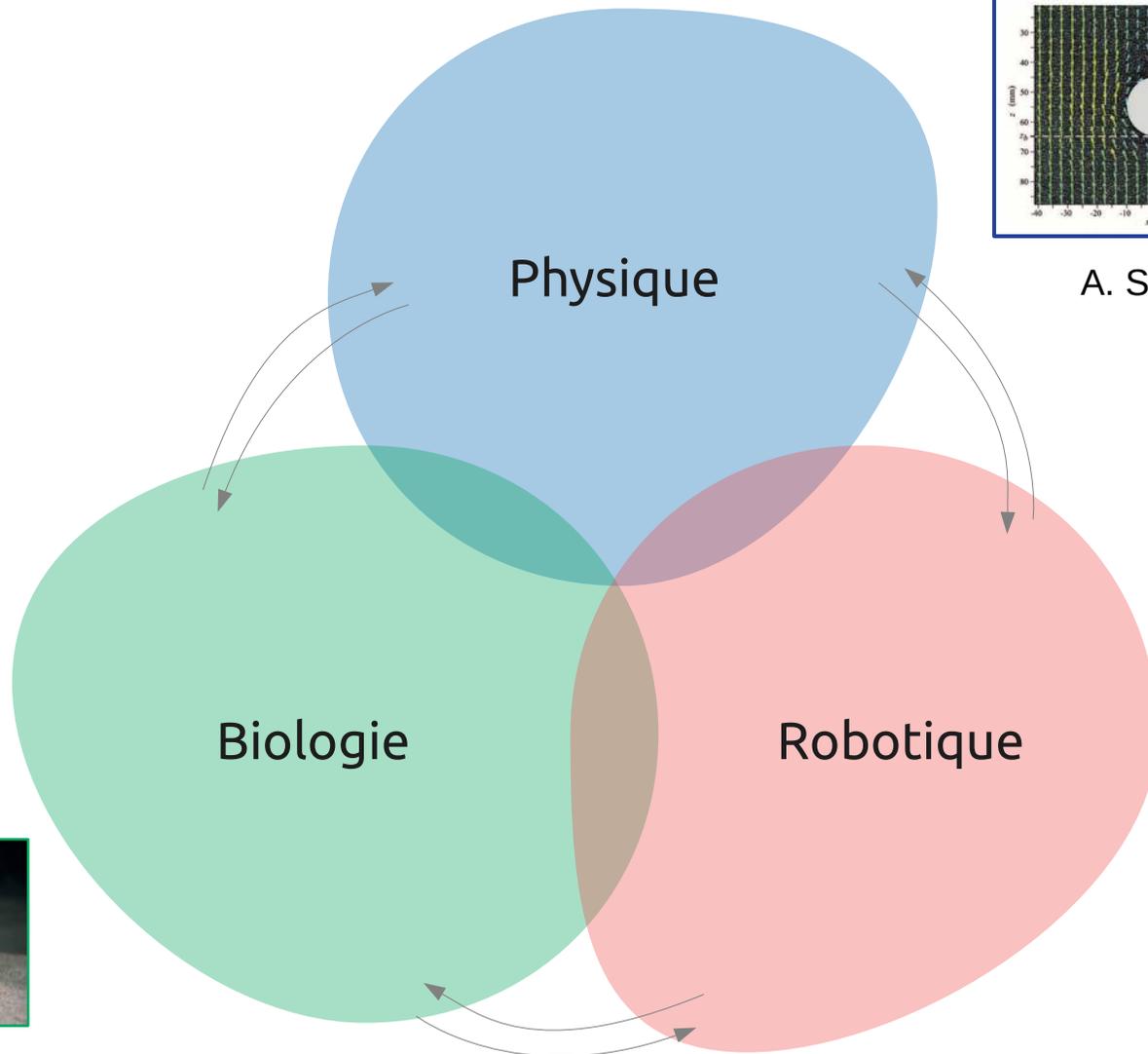


Maladen, R. D., Ding, Y., Li, C., & Goldman, D. I. (2009) Science

## Sand southern octopus



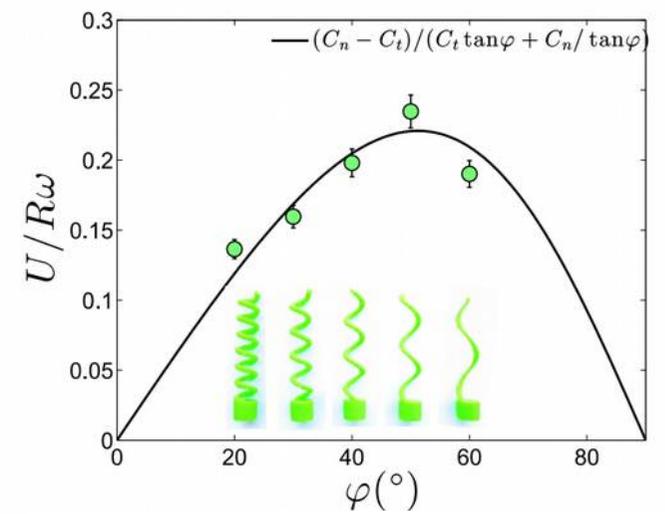
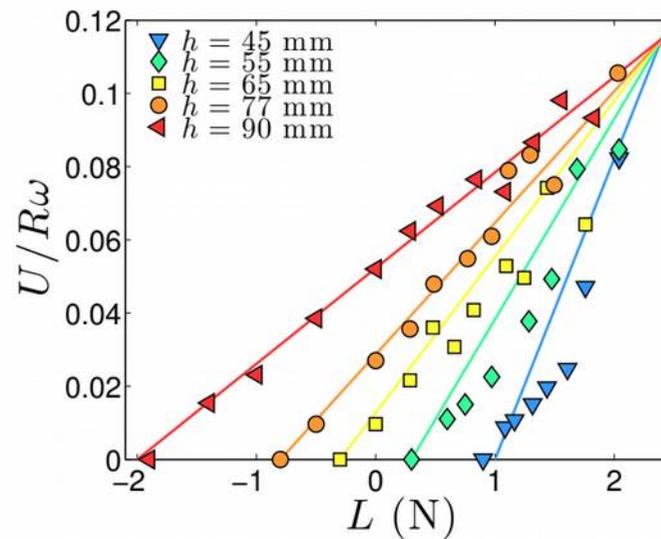
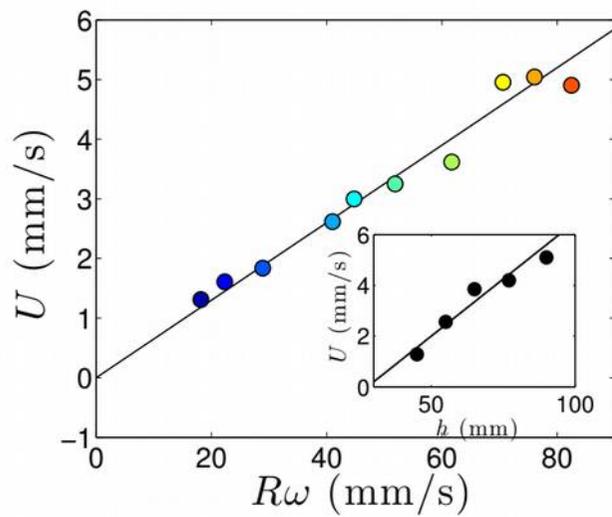
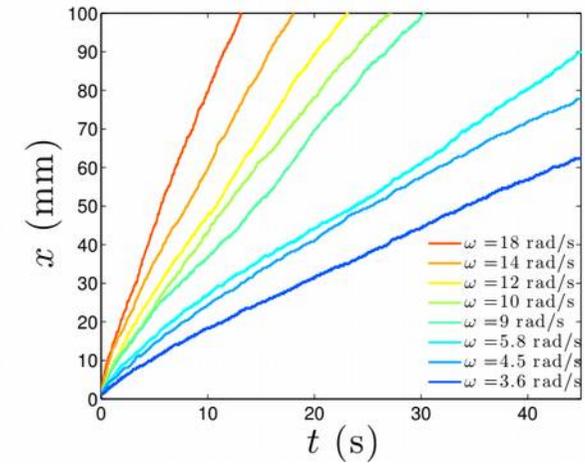
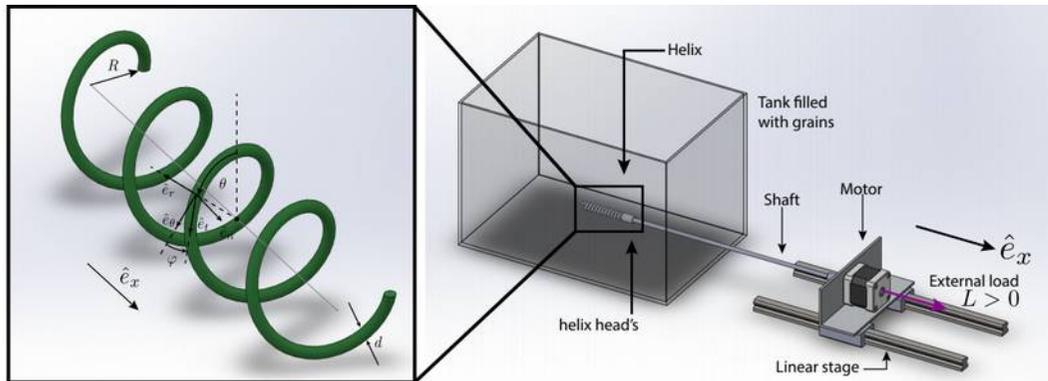
Naclerio, N. D., Karsai, A., Murray-Cooper, M., Ozkan-Aydin, Y., Aydin, E., Goldman, D. I., & Hawkes, E. W. (2021) Science Robotics



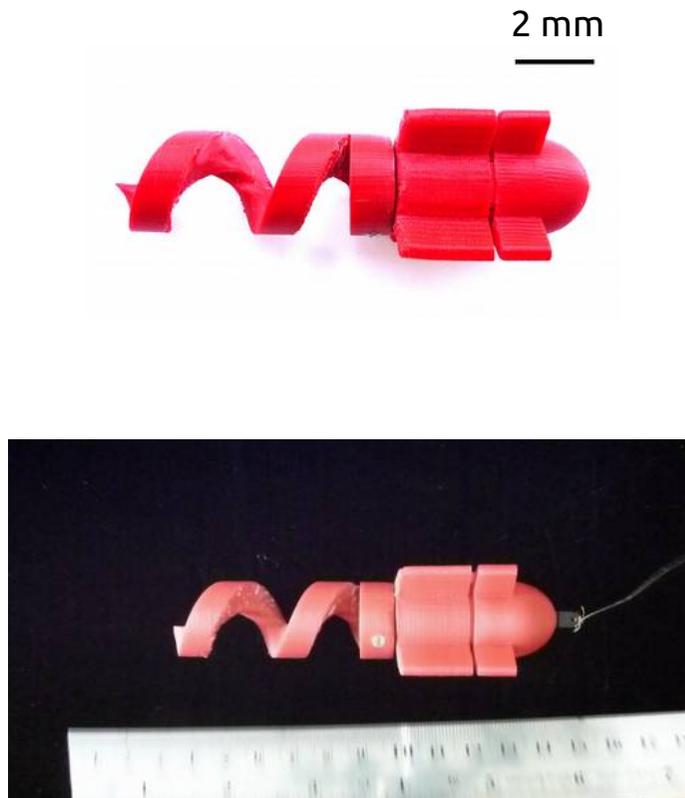
A. Seguin & P. Gondret (FAST)



# Propulsion d'une hélice dans un milieu granulaire



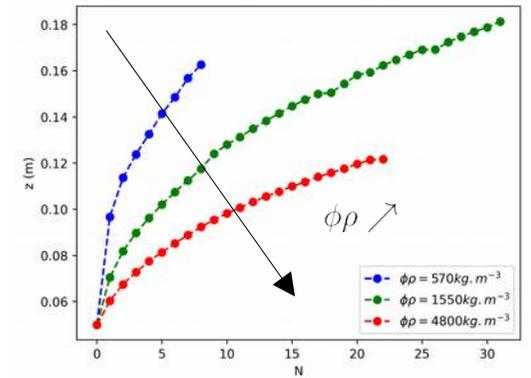
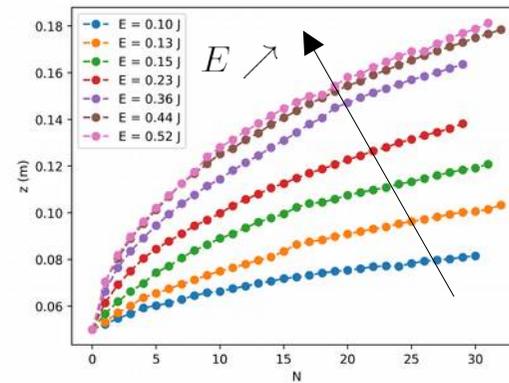
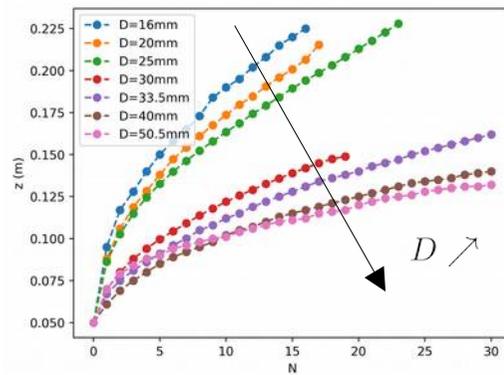
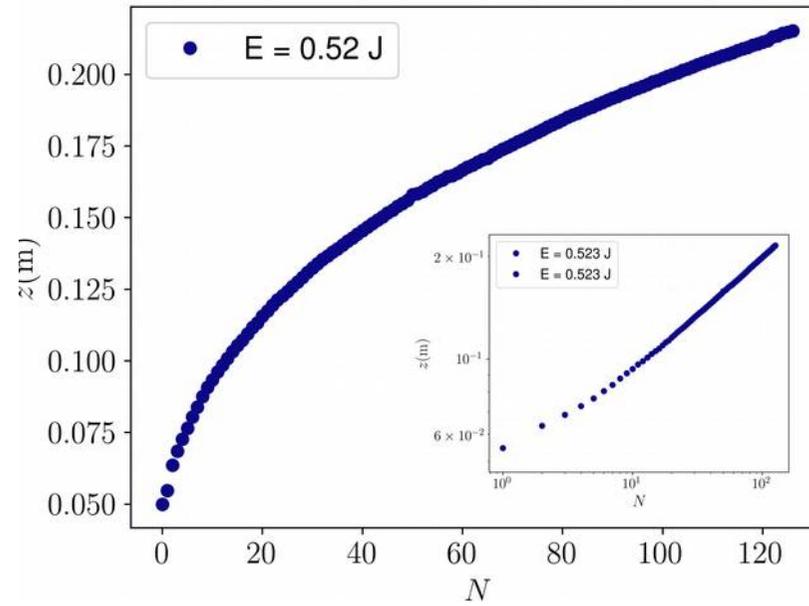
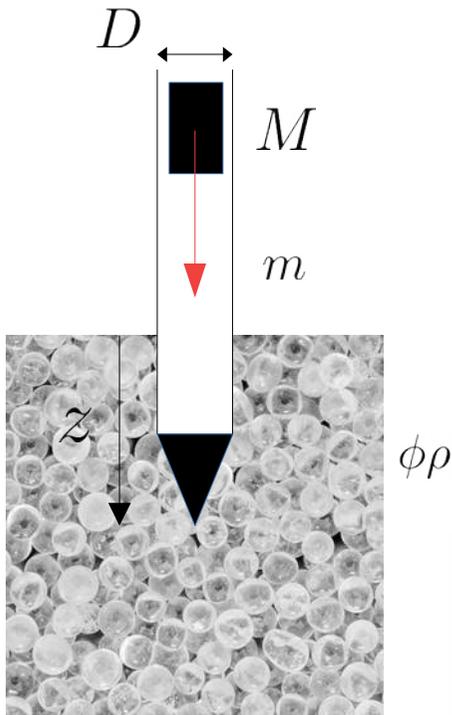
# Propulsion d'une hélice dans un milieu granulaire



Darbois Texier, B. D., Ibarra, A., & Melo, F. (2017) Physical Review Letters

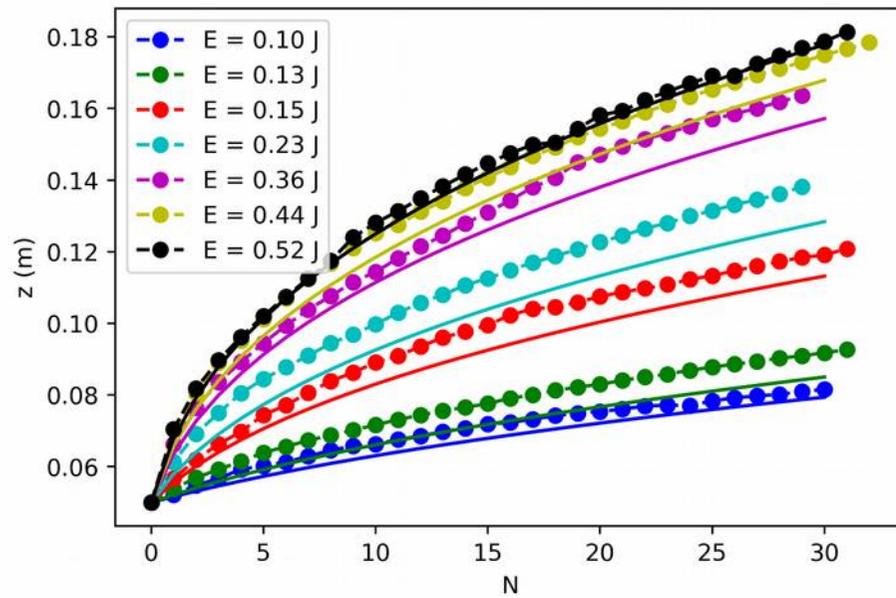
# Intrusion dans un milieu granulaire par percussions

Stage de Hugo Gerard (M1 Physique et Applications, Univ. Paris-Saclay)



# Intrusion dans un milieu granulaire par percussions

$$(m + M) \frac{\partial^2 z}{\partial t^2} = (m + M)g - \phi \rho g \pi D^3 / 4 \left[ C_1 \frac{z}{D} + 2C_2 \left( \frac{z}{D} \right)^2 \right] - C_d \phi \rho D^2 \left( \frac{\partial z}{\partial t} \right)^2$$



NASA's Insight mole



Avec l'aide de L. Auffray et J. Amarni

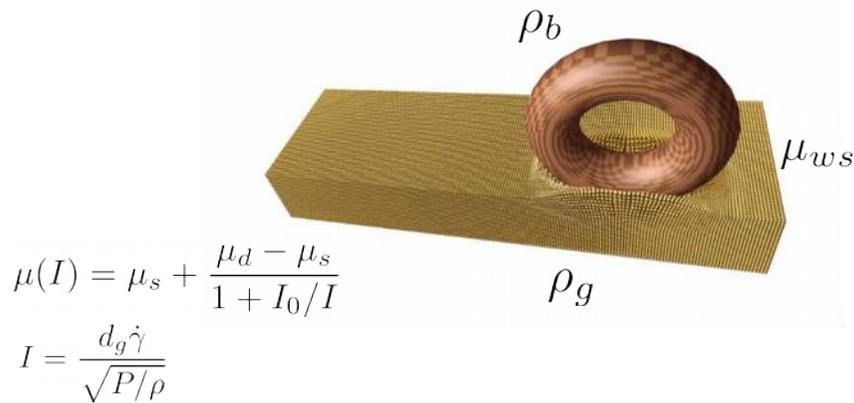
# Propulsion d'une roue motorisée sur un substrat granulaire

## Simulateur Sand 6

Daviet, G., & Bertails-Descoubes, F. (2016) ACM Transactions on Graphics



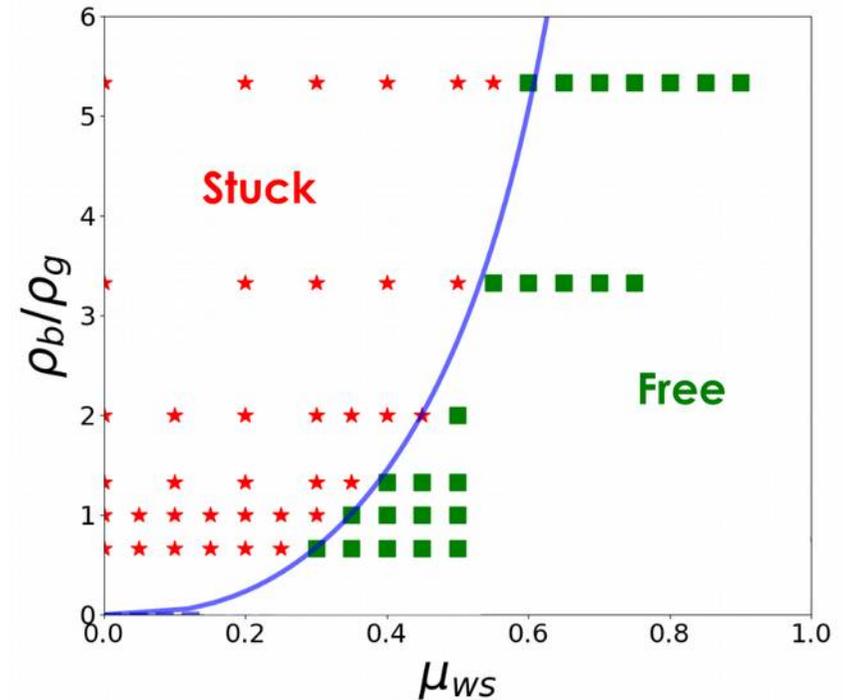
Projet de recherche  
avec les élèves de  
Centrale-Supélec



$\mu_{ws} = 0.2$



$\mu_{ws} = 0.5$



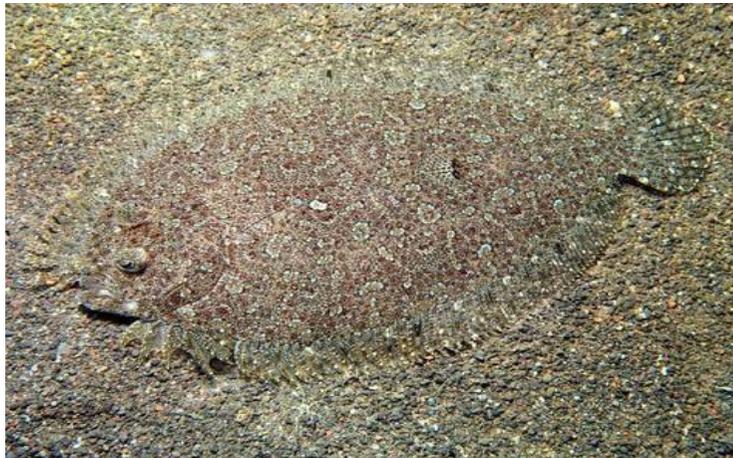
# Stratégie d'enfouissement des poissons plats



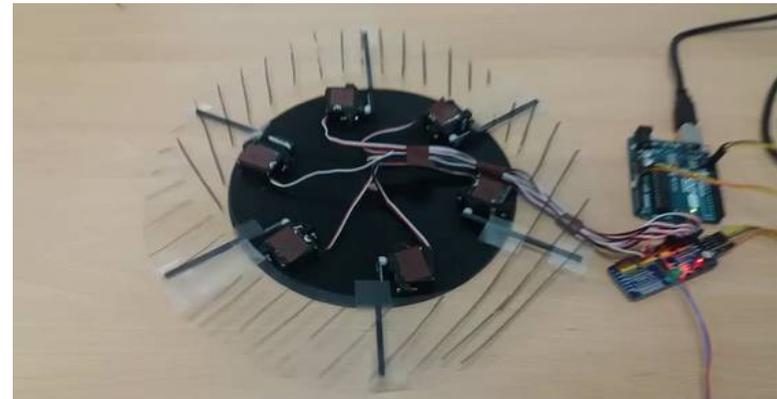
Poissons plats  
(Pleuronectiformes)

# Stratégie d'enfouissement des poissons plats

Stage de Elissa Saad (Master 1 Mécanique, Univ. Paris-Saclay)



Poissons plats  
(Pleuronectiformes)



Avec l'aide de L. Auffray et A. Aubertin



Sand dollar



Razor clam



Silver ants



Golden mole

Merci pour votre attention



Sandfish lizard



Rattle snake



Sand lance



Desert beetle

