



milieux granulaires

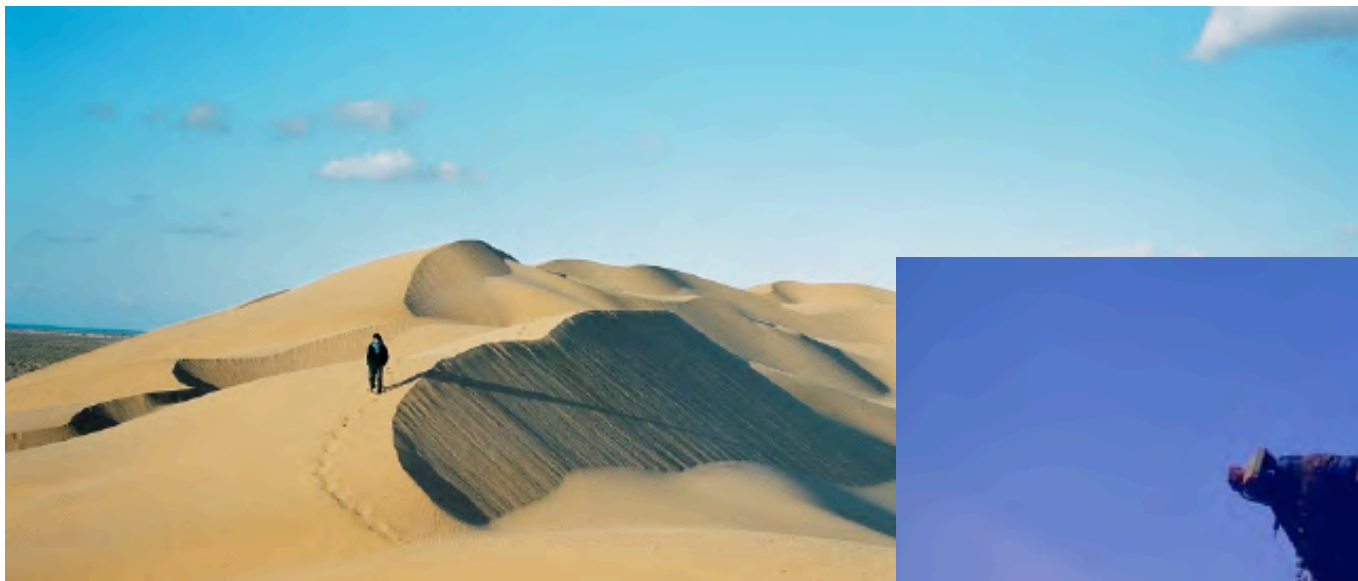
groupe FCIH

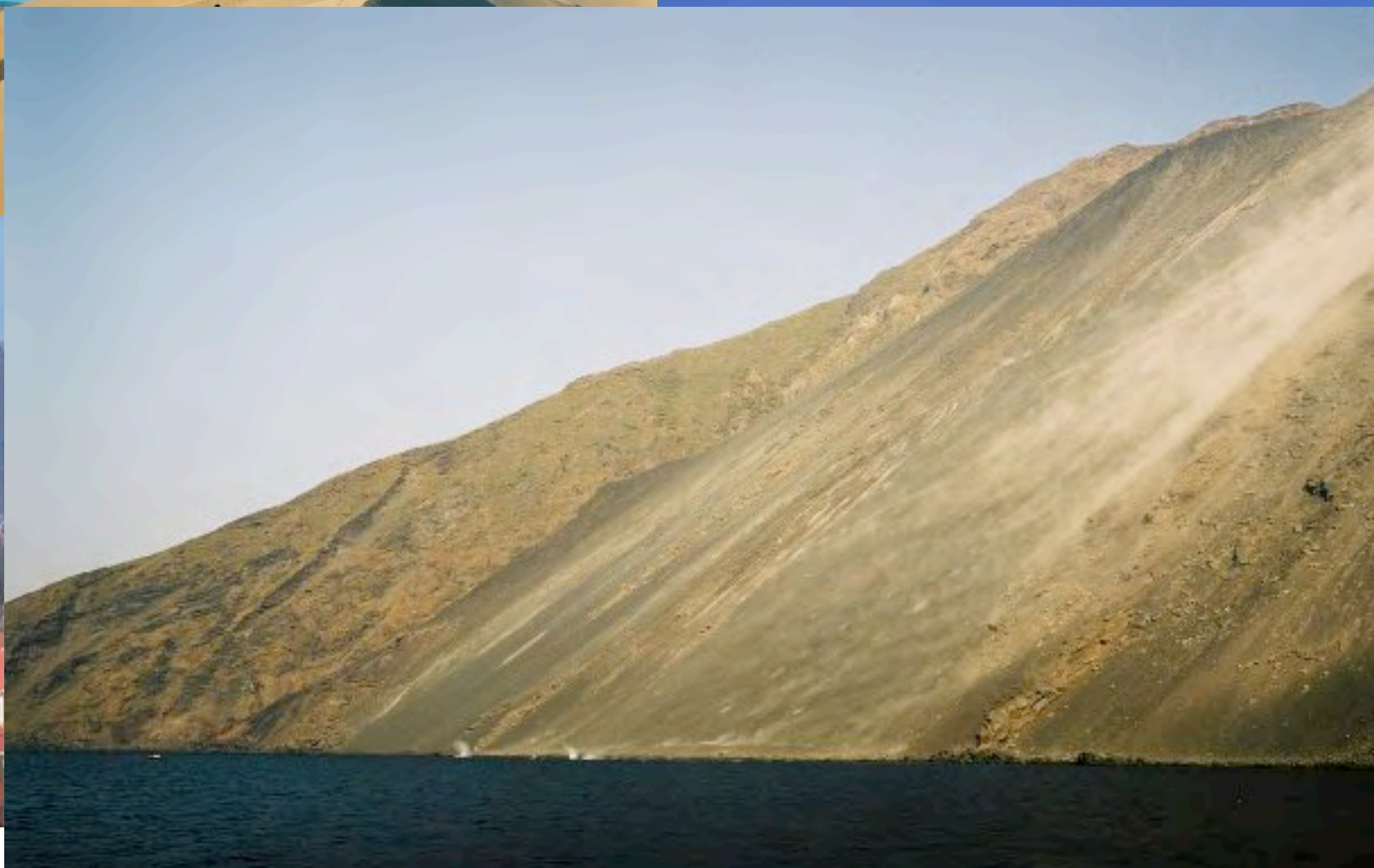
20/01/2006

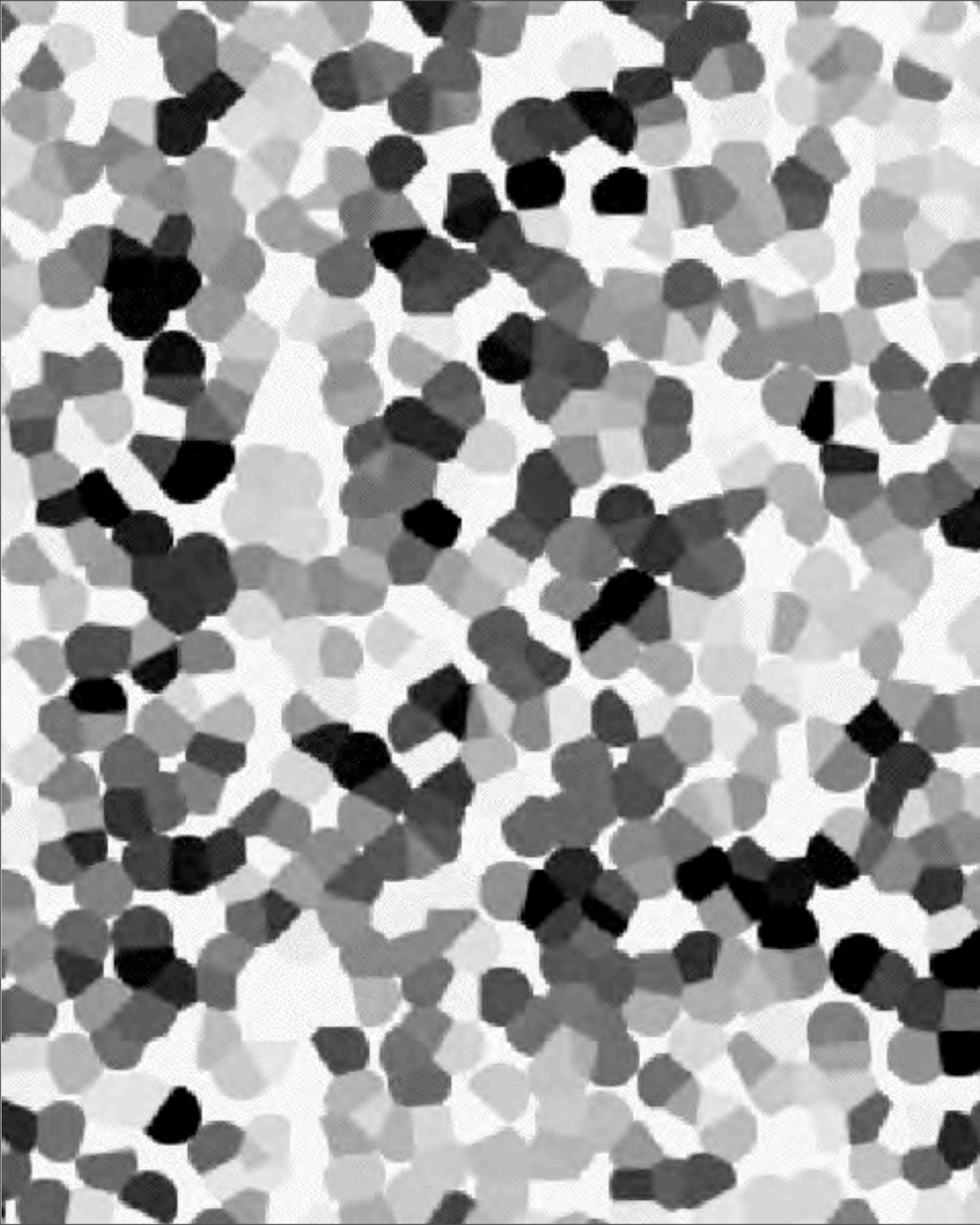
Institut Jean le Rond d'Alembert

www.lmm.jussieu.fr









~~grains~~

hypothèse de milieu
continu



~~grains~~

hypothèse de milieu
continu



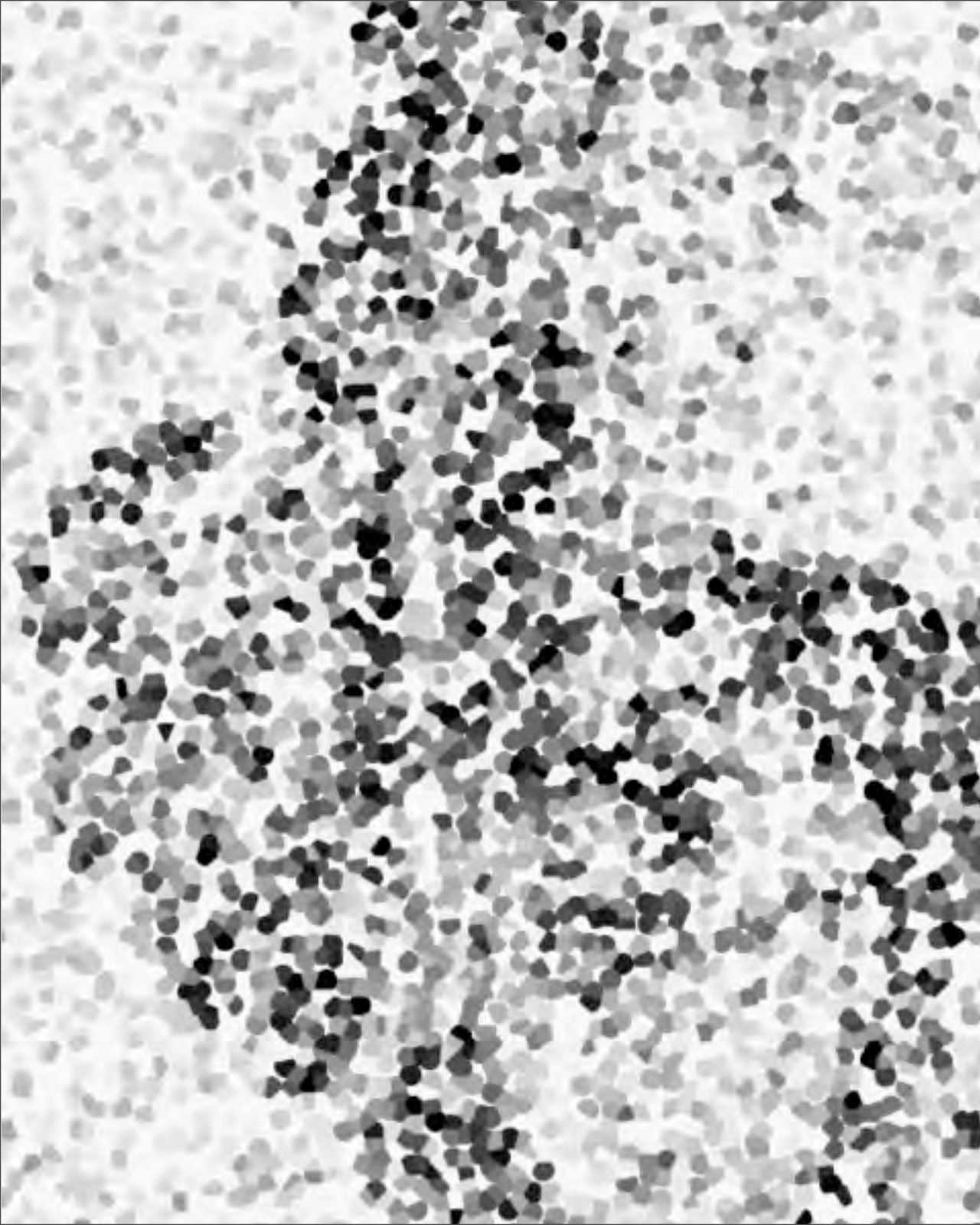
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hypothèse de milieu
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hypothèse de milieu
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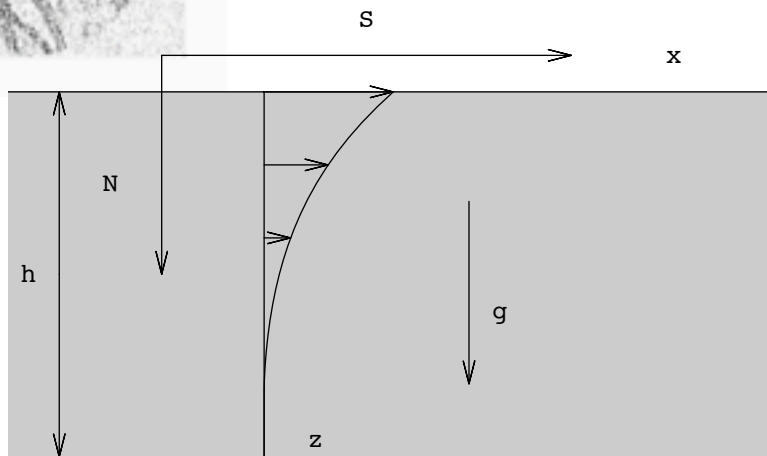


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hypothèse de milieu
continu



hypothèse de milieu continu



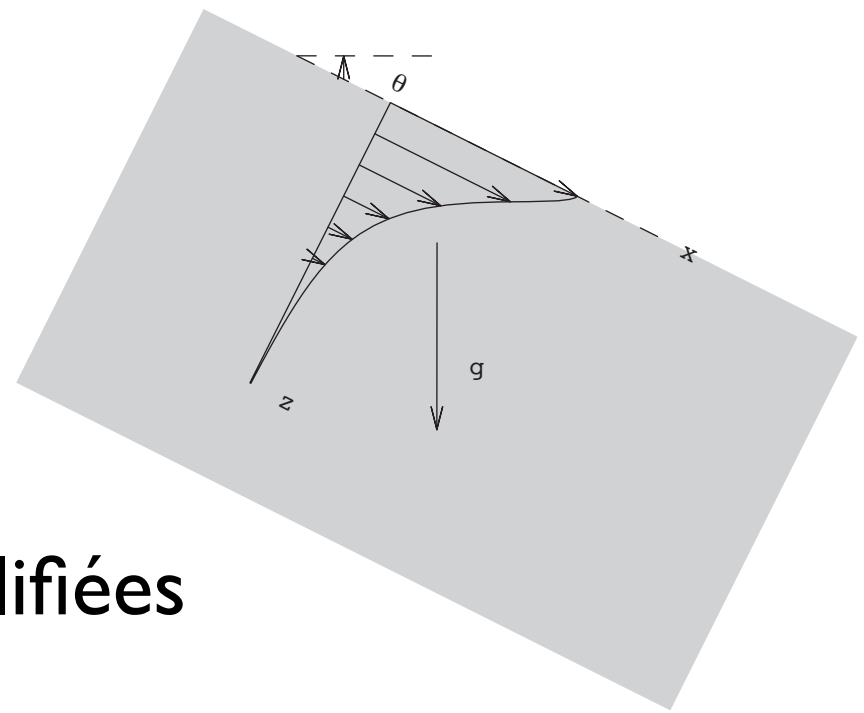
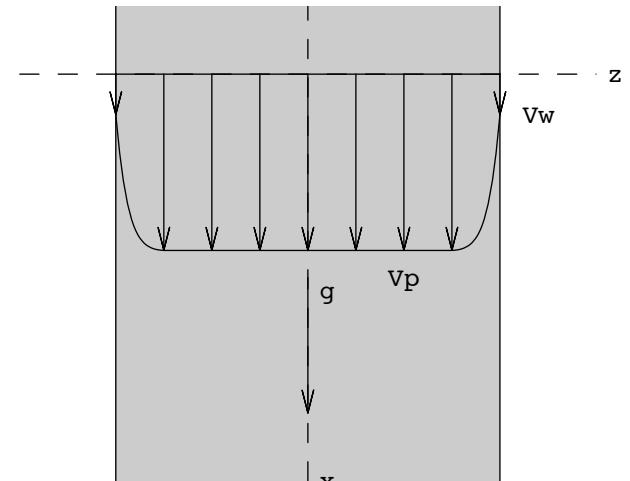
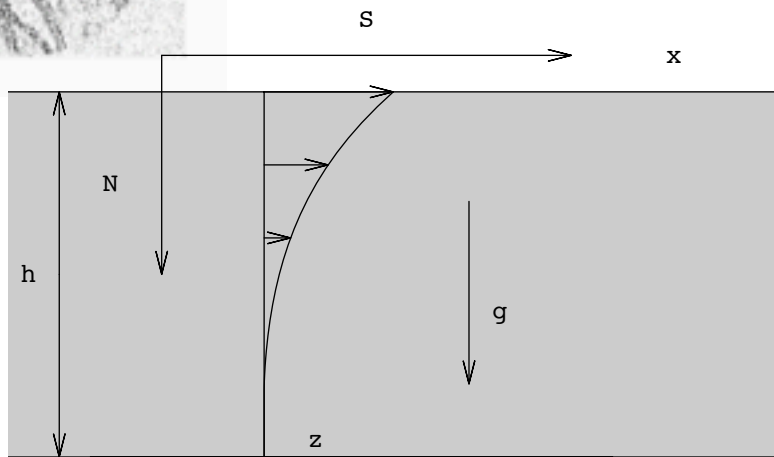
$$\sigma_{zz} = \text{“pression granulaire”} + \text{“dilatance de Reynolds”}$$

$$\sigma_{xz} = \mu\sigma_{zz} \text{“Coulomb”} + \text{“cisaillement de Bagnold”}$$

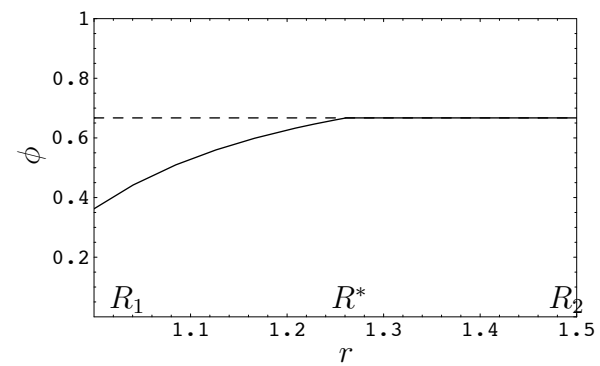
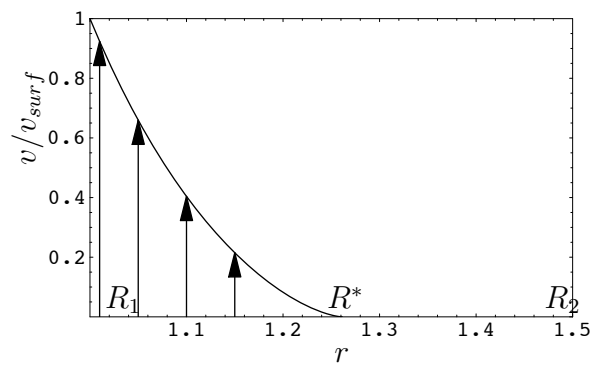
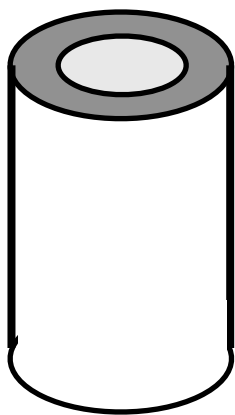
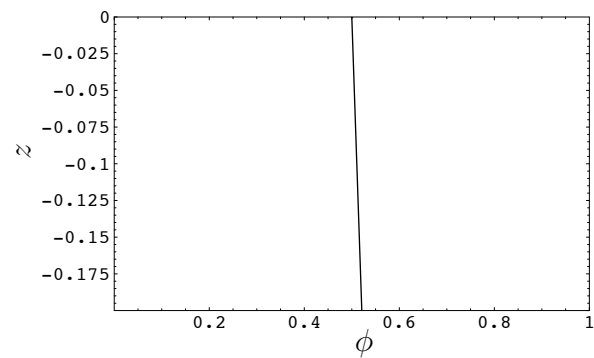
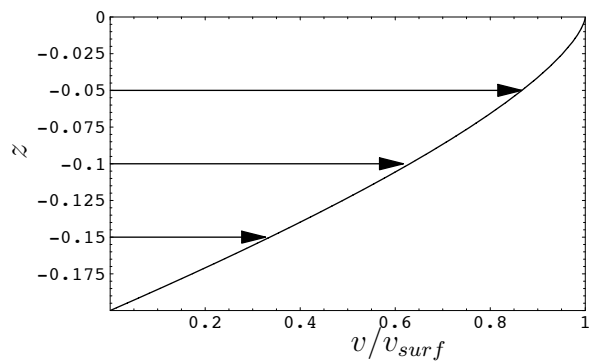
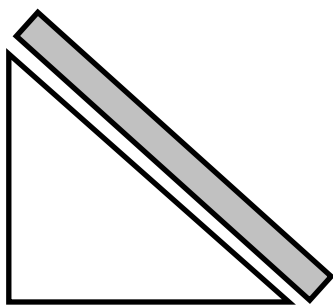
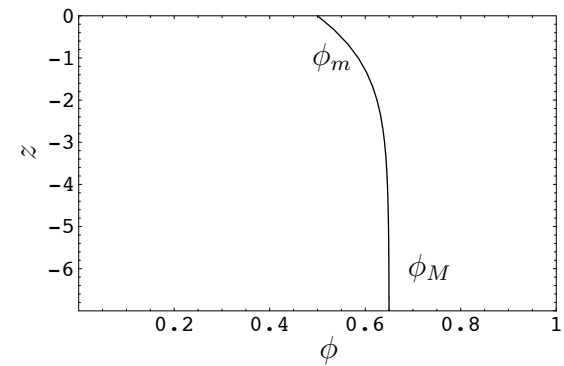
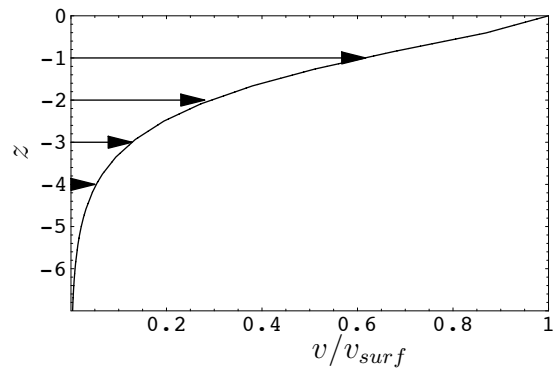
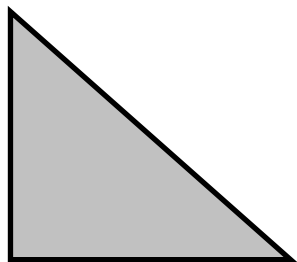
équations constitutives simplifiées



Écoulements cisailés

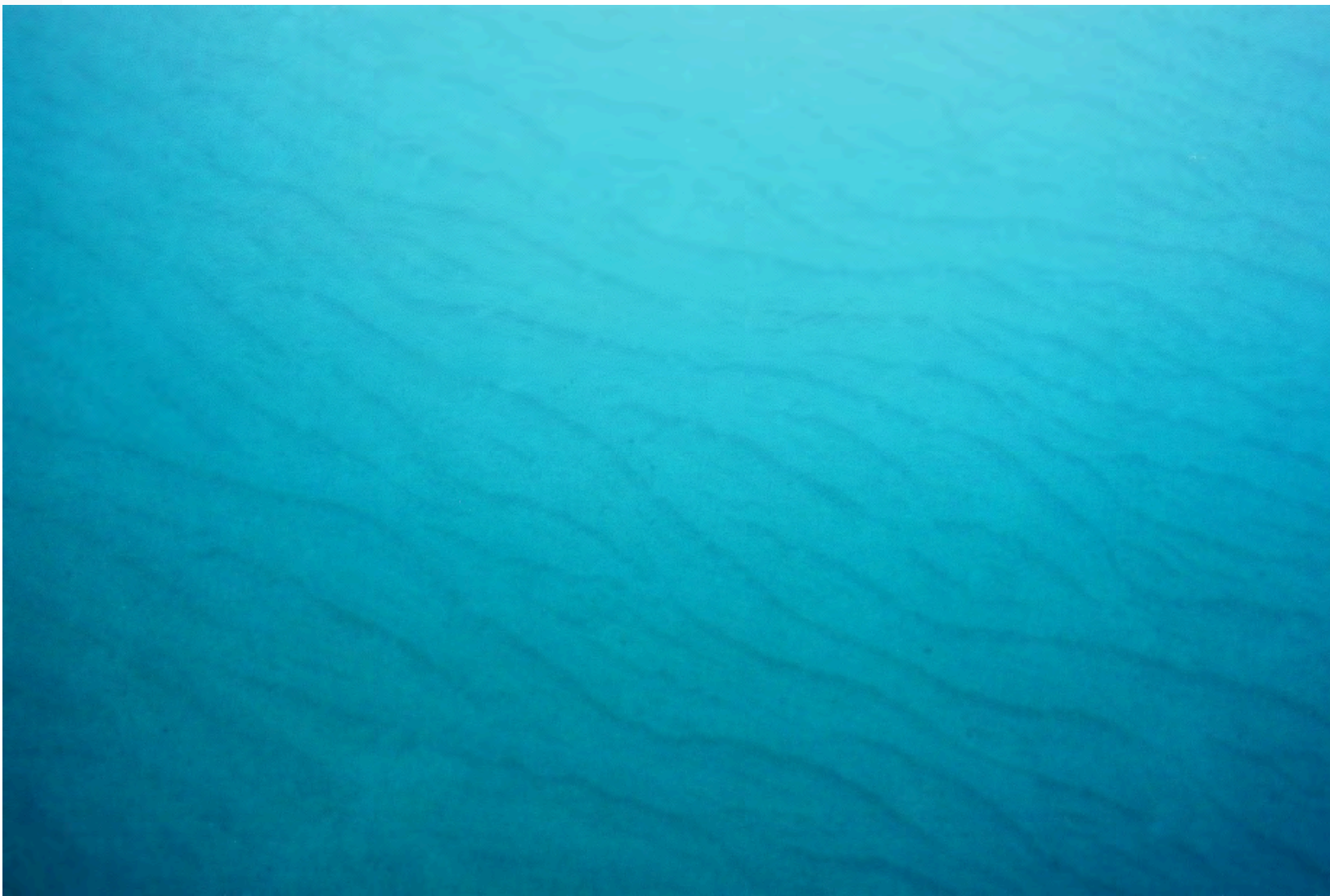


équations constitutives simplifiées



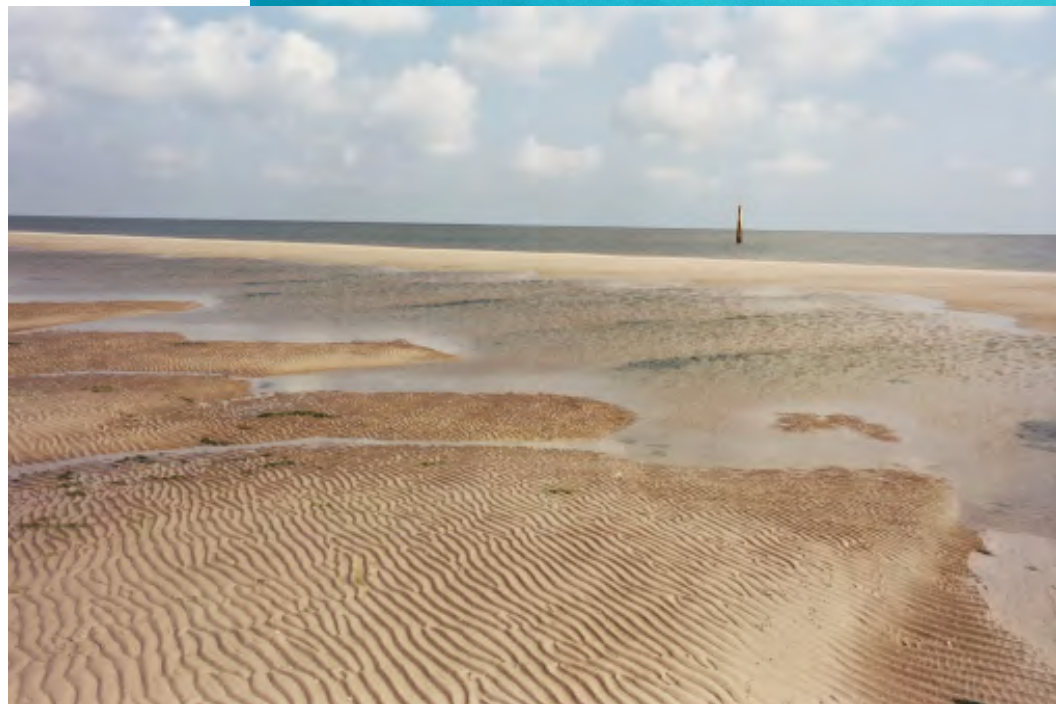


stabilité des fonds érodables



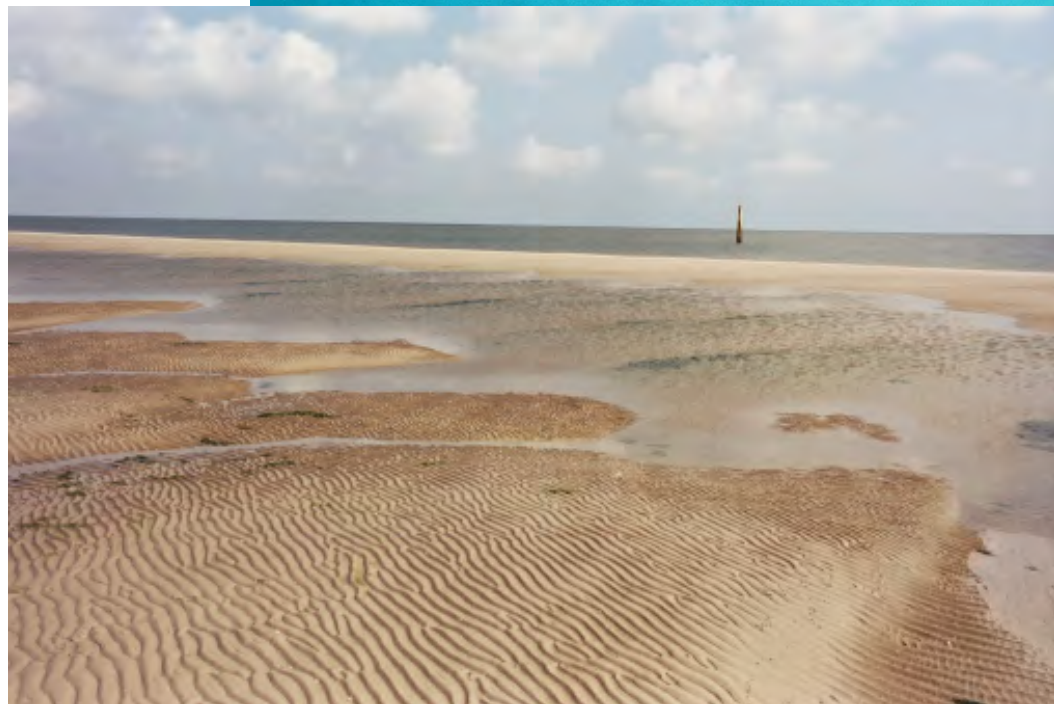


stabilité des fonds érosionnables



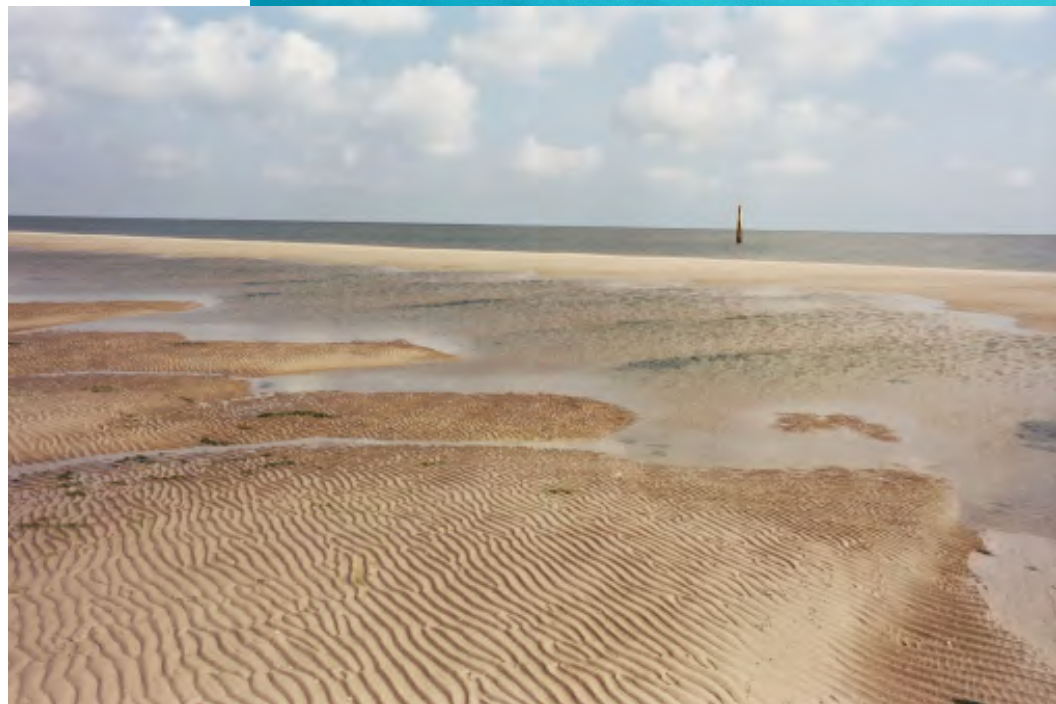


stabilité des fonds érosionnables



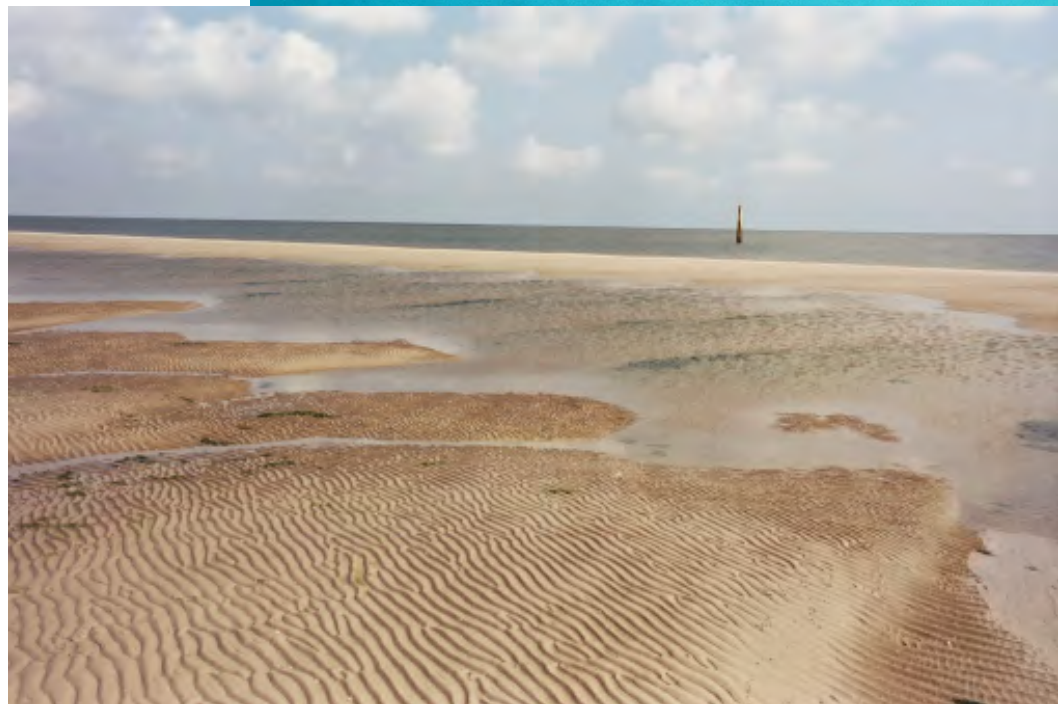


stabilité des fonds érosionnables





stabilité des fonds érosibles



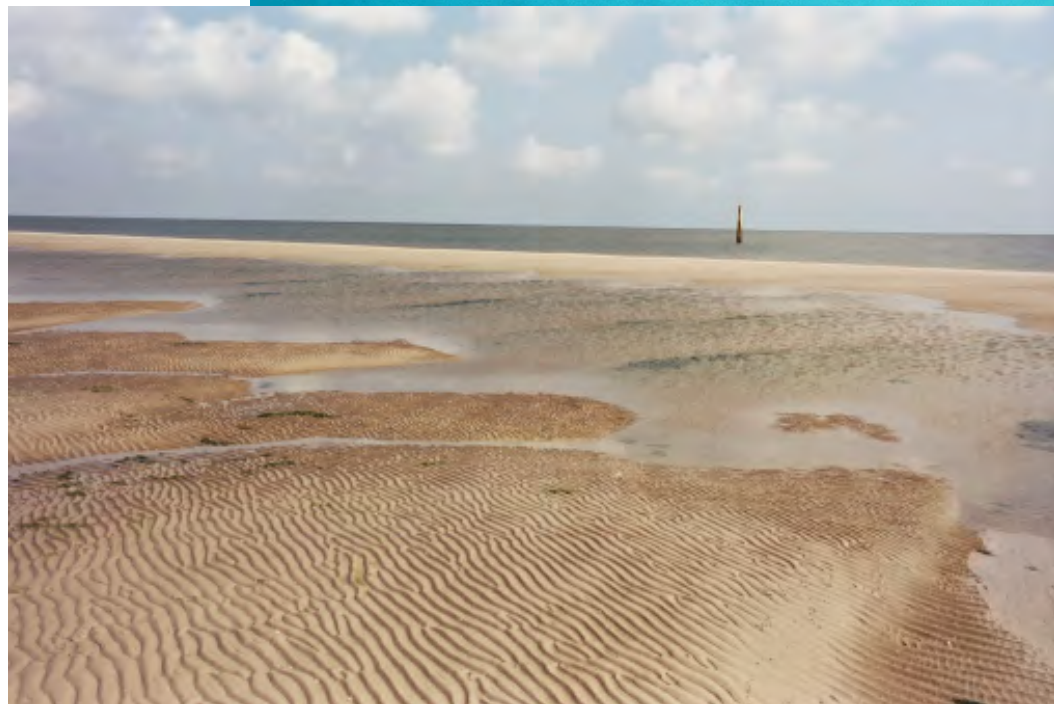


stabilité des fonds érodables



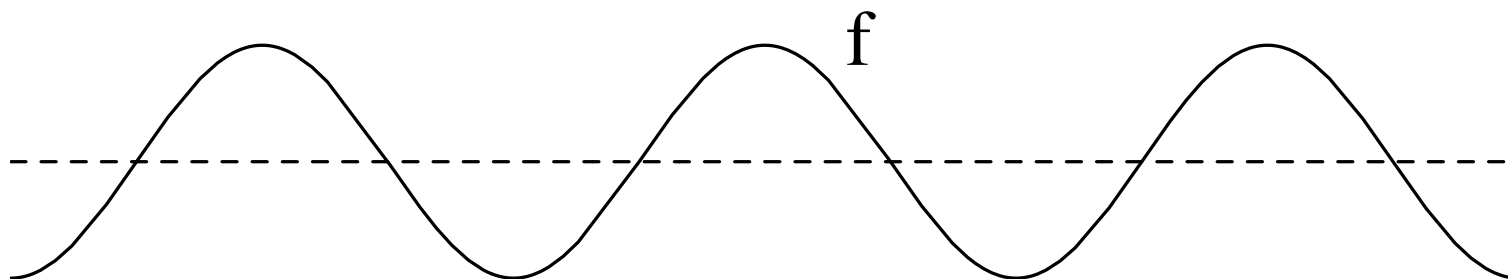


stabilité des fonds érosibles





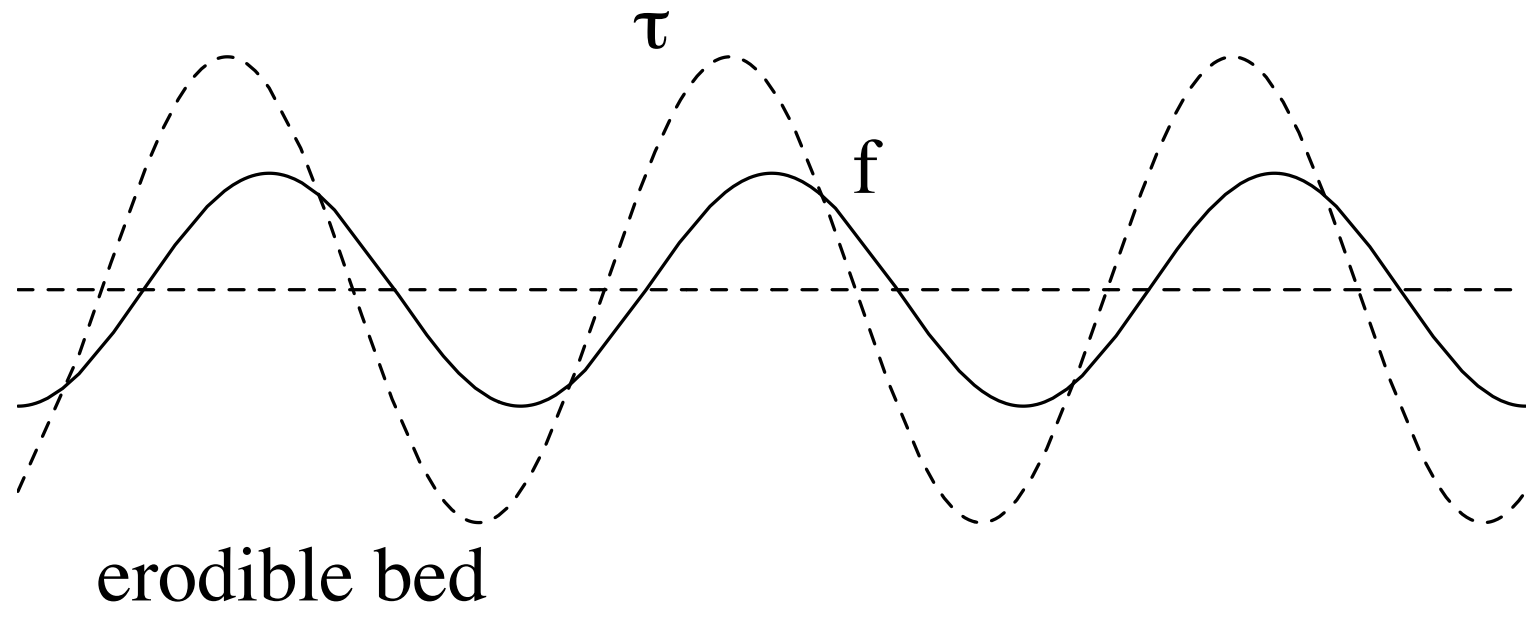
fluid



erodible bed

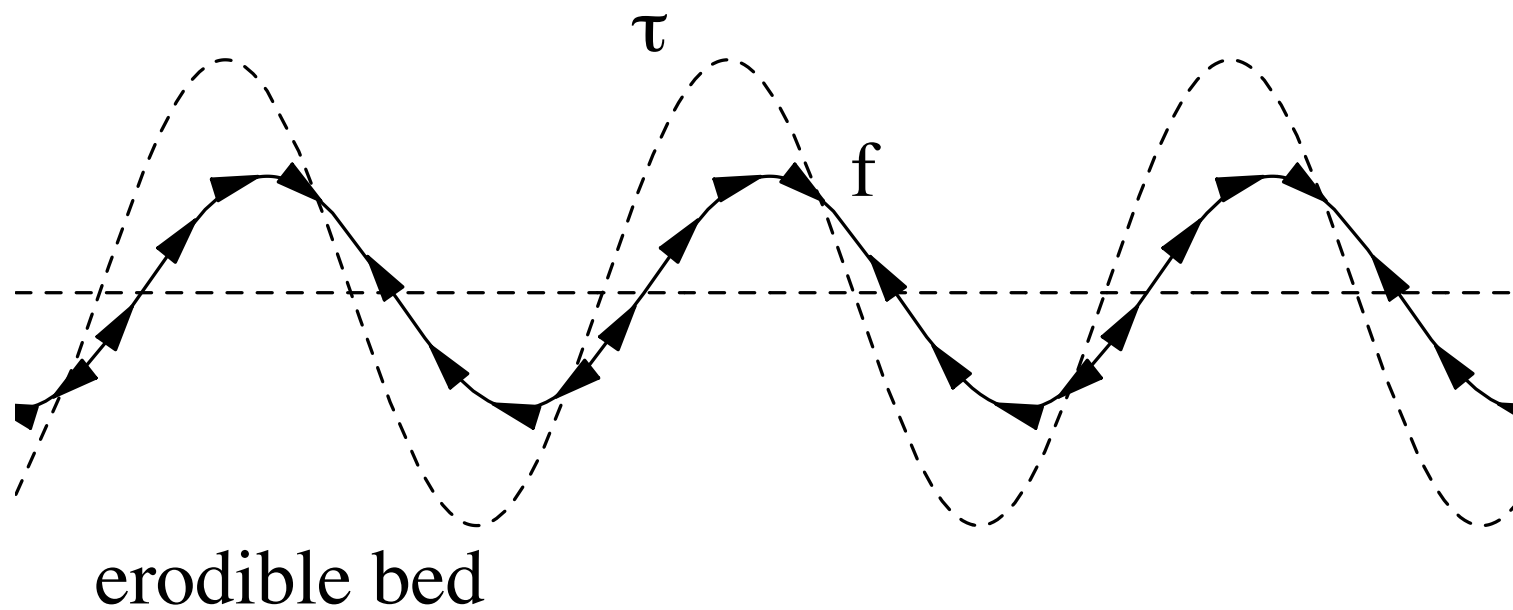


fluid \longrightarrow



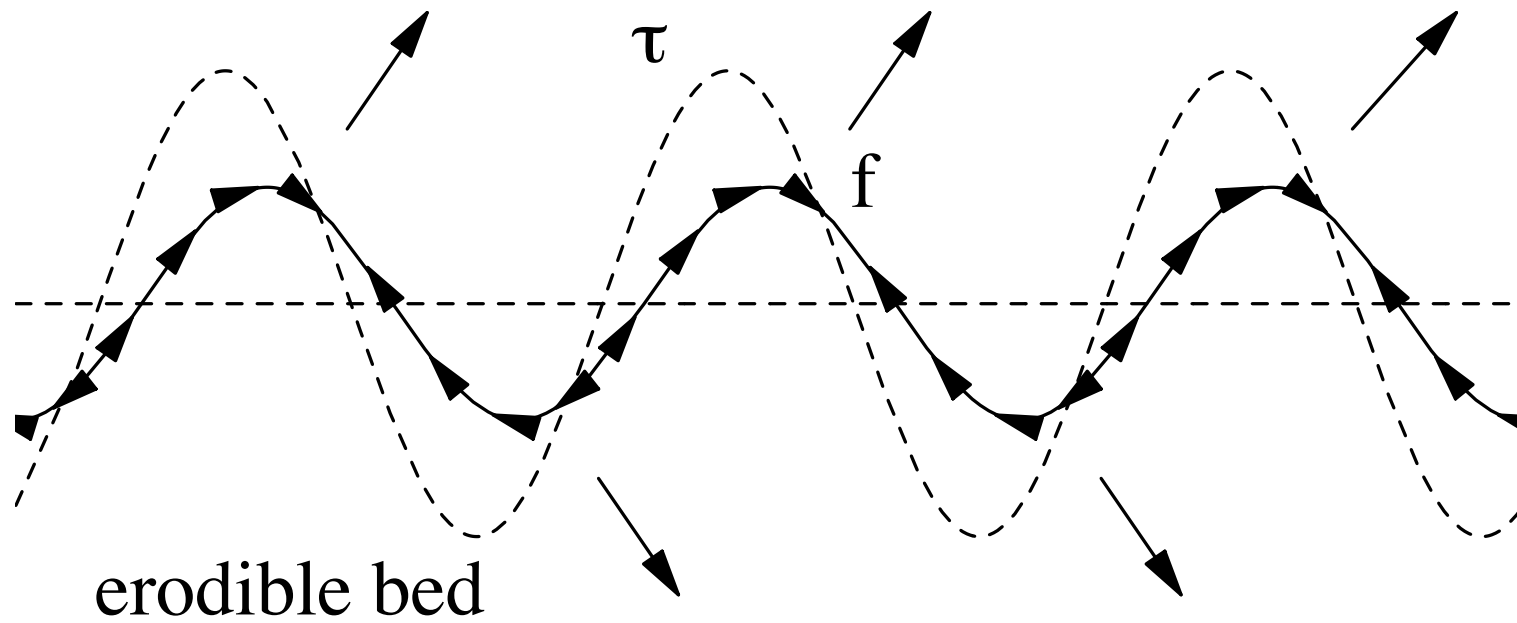


fluid \longrightarrow



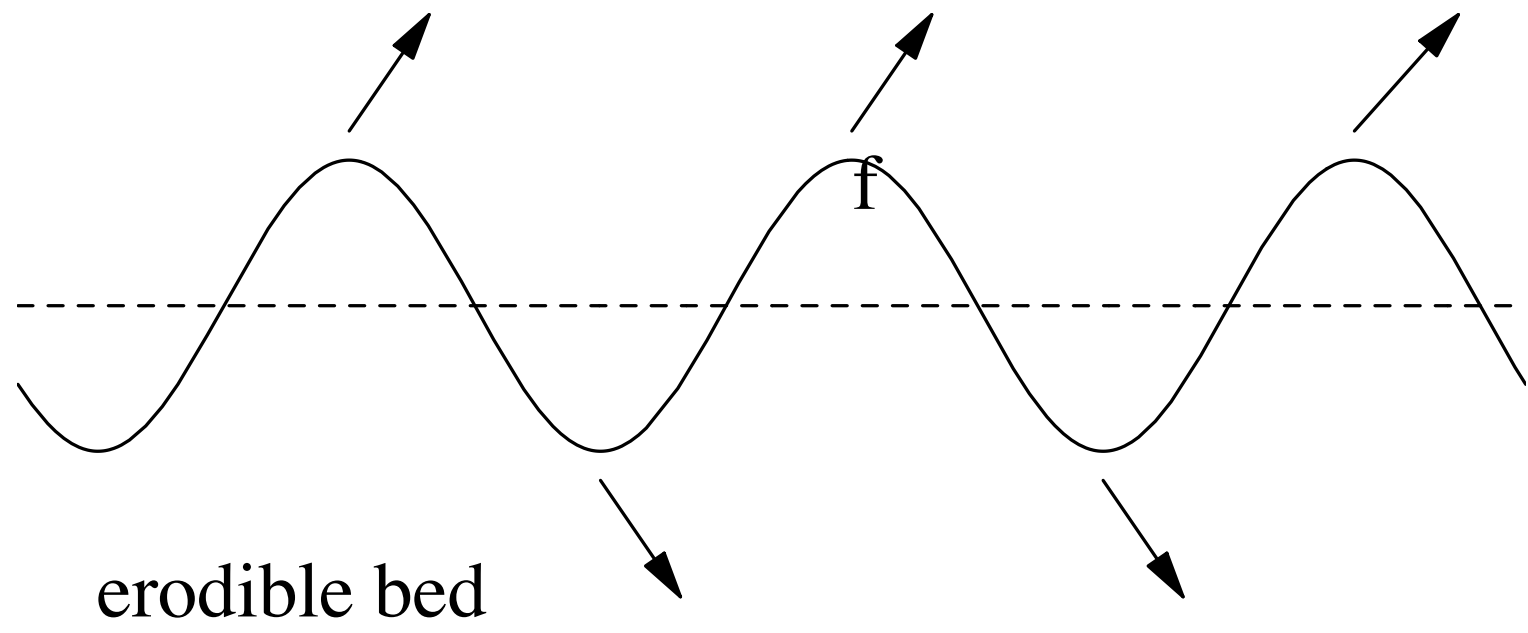


fluid \longrightarrow



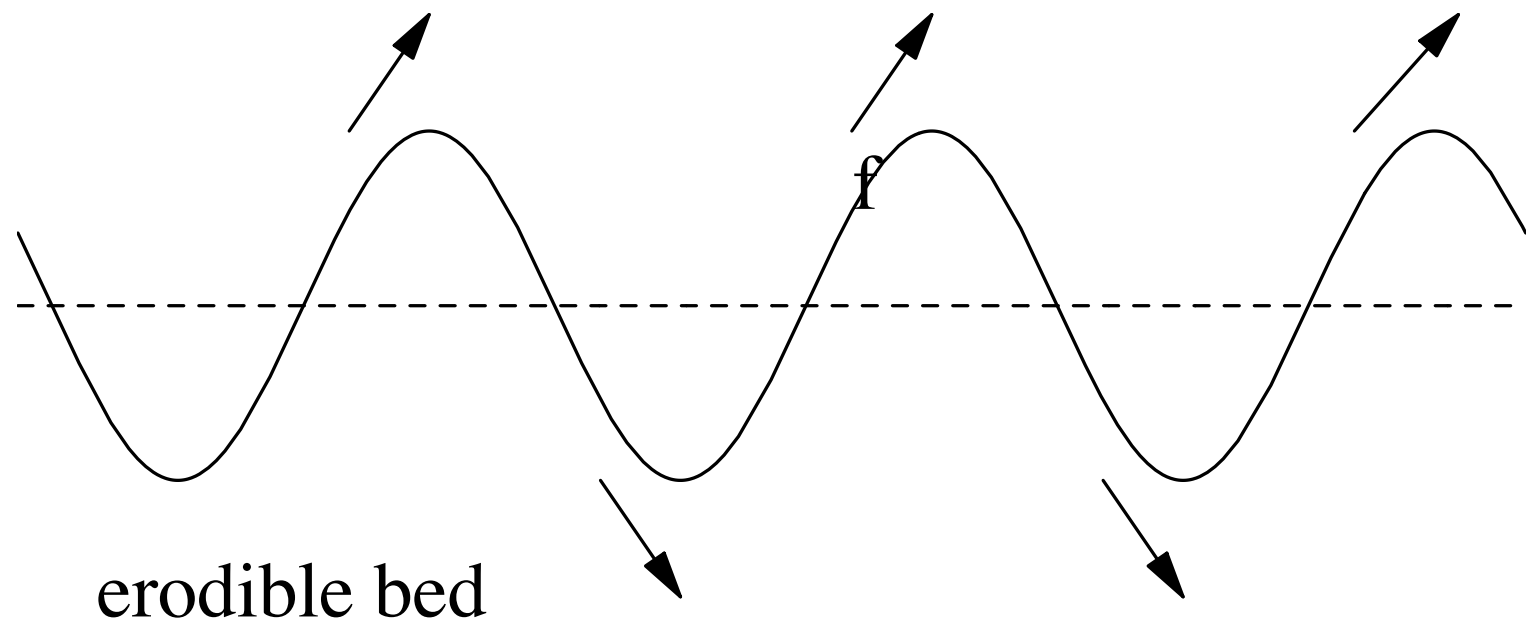


fluid \longrightarrow



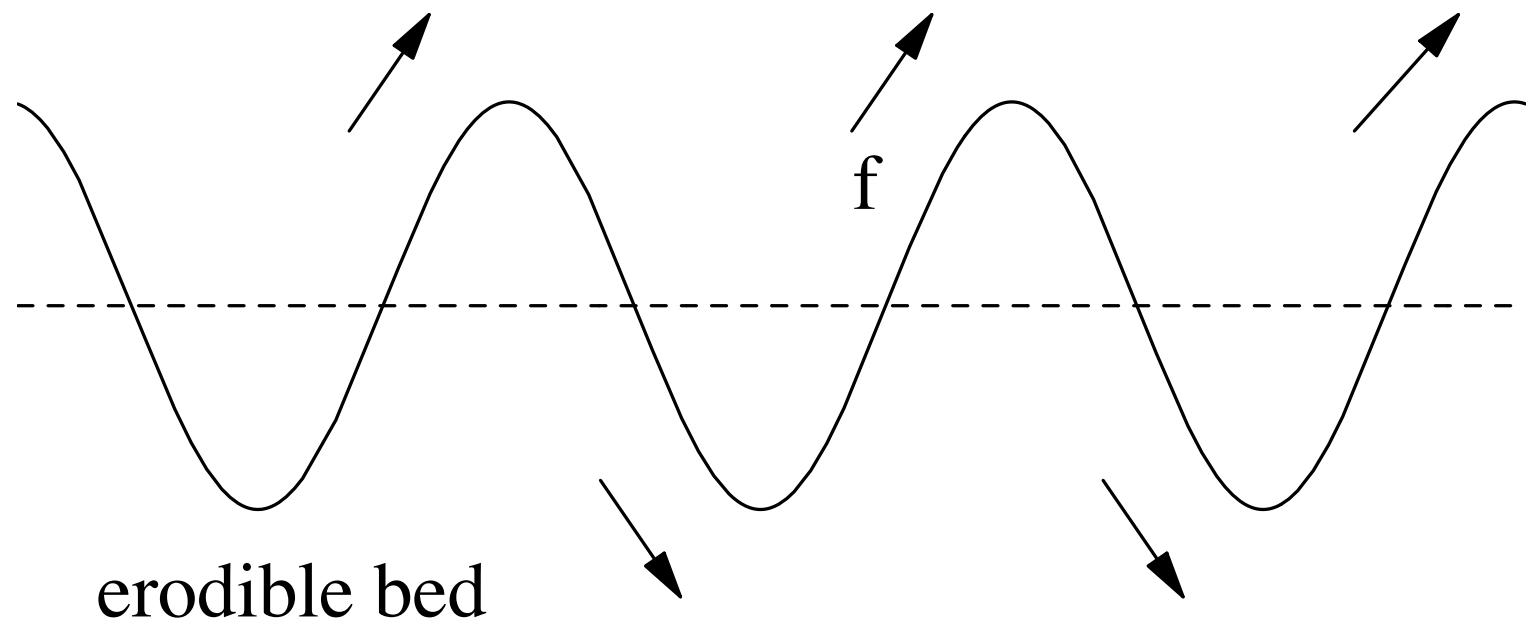


fluid \longrightarrow



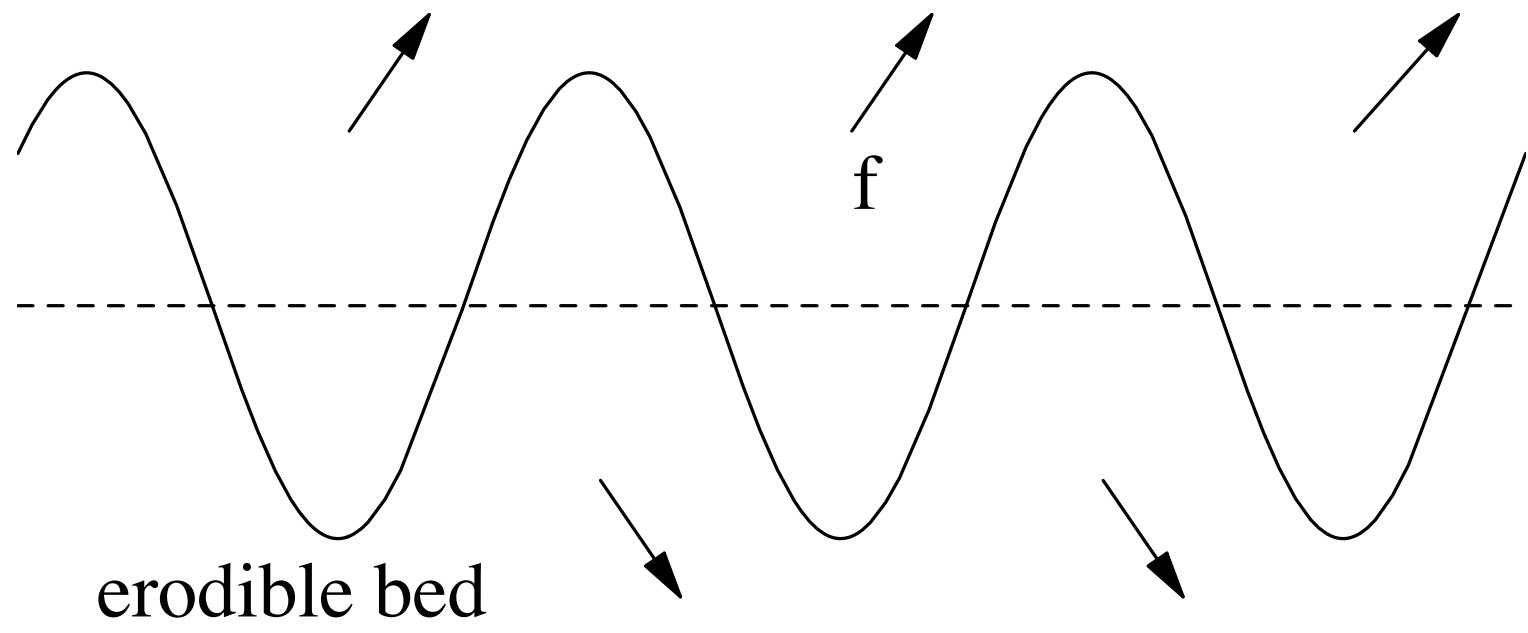


fluid 



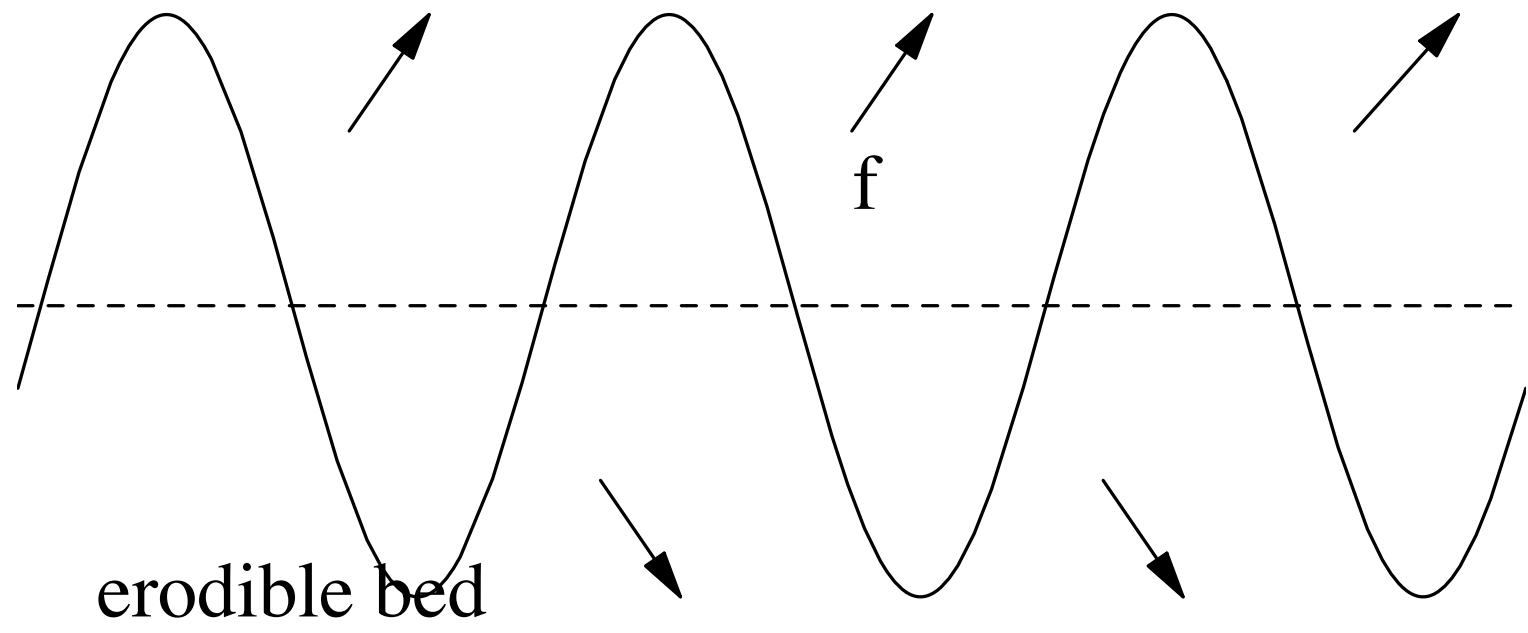


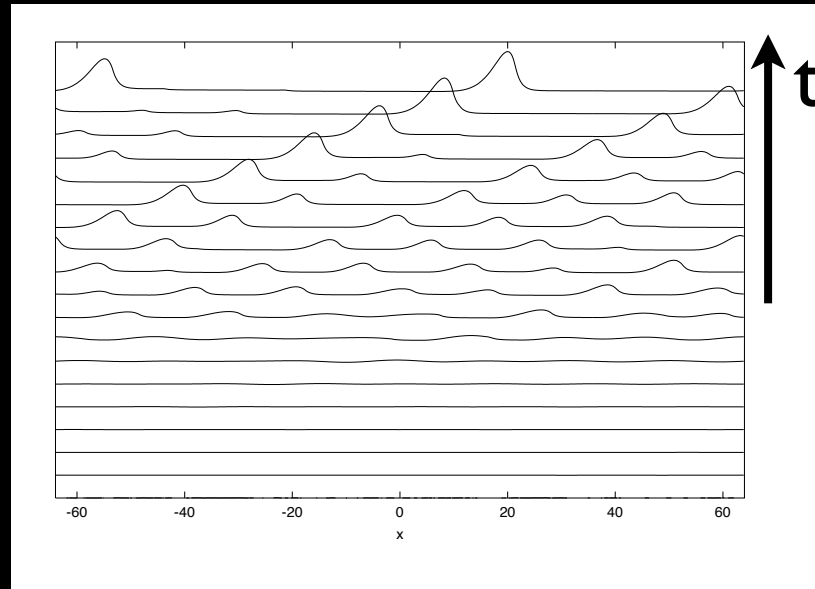
fluid 





fluid 







perspectives

- contacts avec la communauté granulaire
- équations constitutives pour l'érosion
- applications: dunes, méandres etc.

