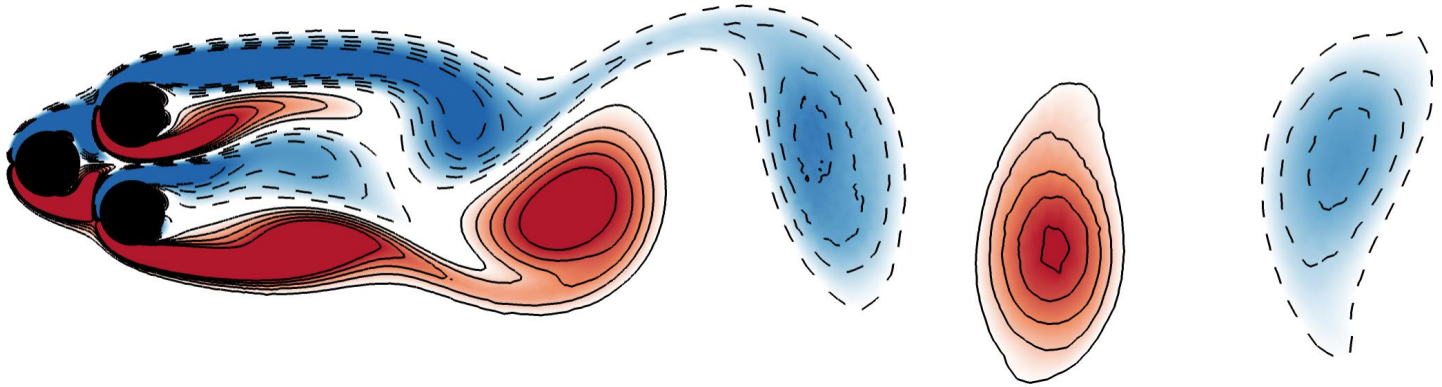


Dynamiques transitoires de sillage dans le << pinball fluidique>>

Nan DENG [1,2], Luc R. PASTUR [1], Bernd R. NOACK [2,3,4], Guy CORNEJO-MACEDA [2],
François LUSSEYRAN [2], Jean-Christophe LOISEAU [5], Marek MORZYNSKI [6]

[1] IMSIA – UMR9219 , ENSTA ParisTech, Palaiseau, France
[2] LIMSI – CNRS, Université Paris Saclay, Orsay, France
[3] Harbin Institute of Technology, China
[4] Technische Universität Berlin, Allemagne
[5] Laboratoire DynFluid, École Nationale Supérieure d'Arts et Métiers, Paris, France
[6] Poznan University of Technology, Pologne

Route to chaos

Steady solution | Mean flow field | Flow field snapshot

$Re = 10$

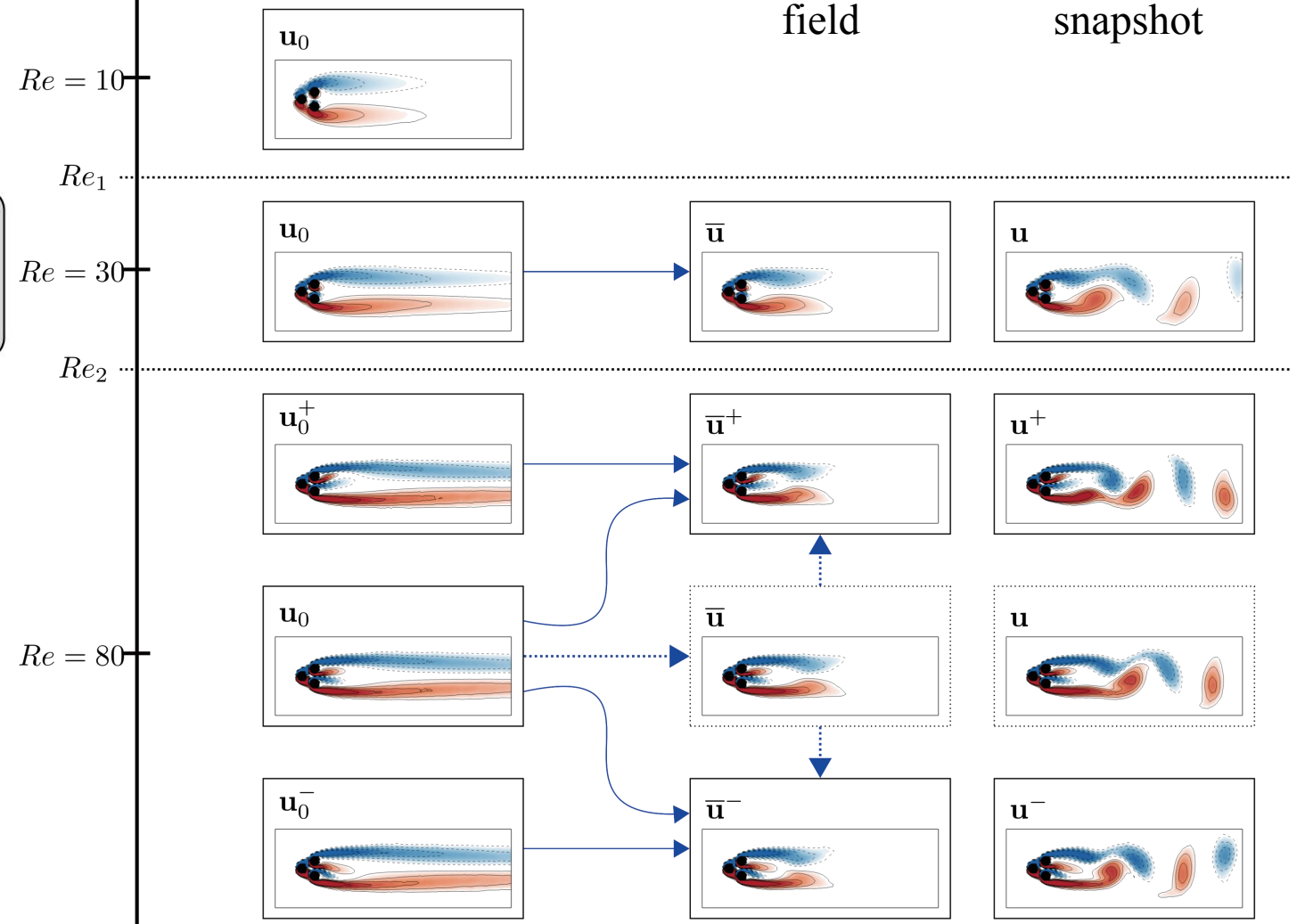
Re_1

$Re = 30$

Re_2

$Re = 80$

Re



3 d.o.f

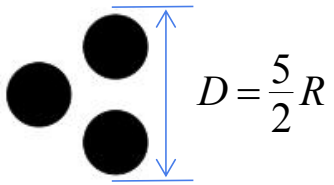
Hopf

$$da_1/dt = (\sigma_1 - \beta a_3)a_1 - (\omega_1 + \gamma a_3)a_2$$
$$da_2/dt = (\sigma_1 - \beta a_3)a_2 + (\omega_1 + \gamma a_3)a_1$$
$$da_3/dt = \sigma_3 a_3 + \beta_3(a_1^2 + a_2^2)$$

2 d.o.f

+ Pitchfork

$$da_4/dt = \sigma_4 a_4 - \beta_4 a_4 a_5$$
$$da_5/dt = \sigma_5 a_5 + \beta_5 a_4^2$$



$$D = \frac{5}{2}R$$

$$\mathrm{Re} = \frac{UR}{\nu}$$

Hopf

+

Pitchfork

+

Neimark-Sacker

↓

Chaos

Newhouse-Ruelle-Takens route to chaos