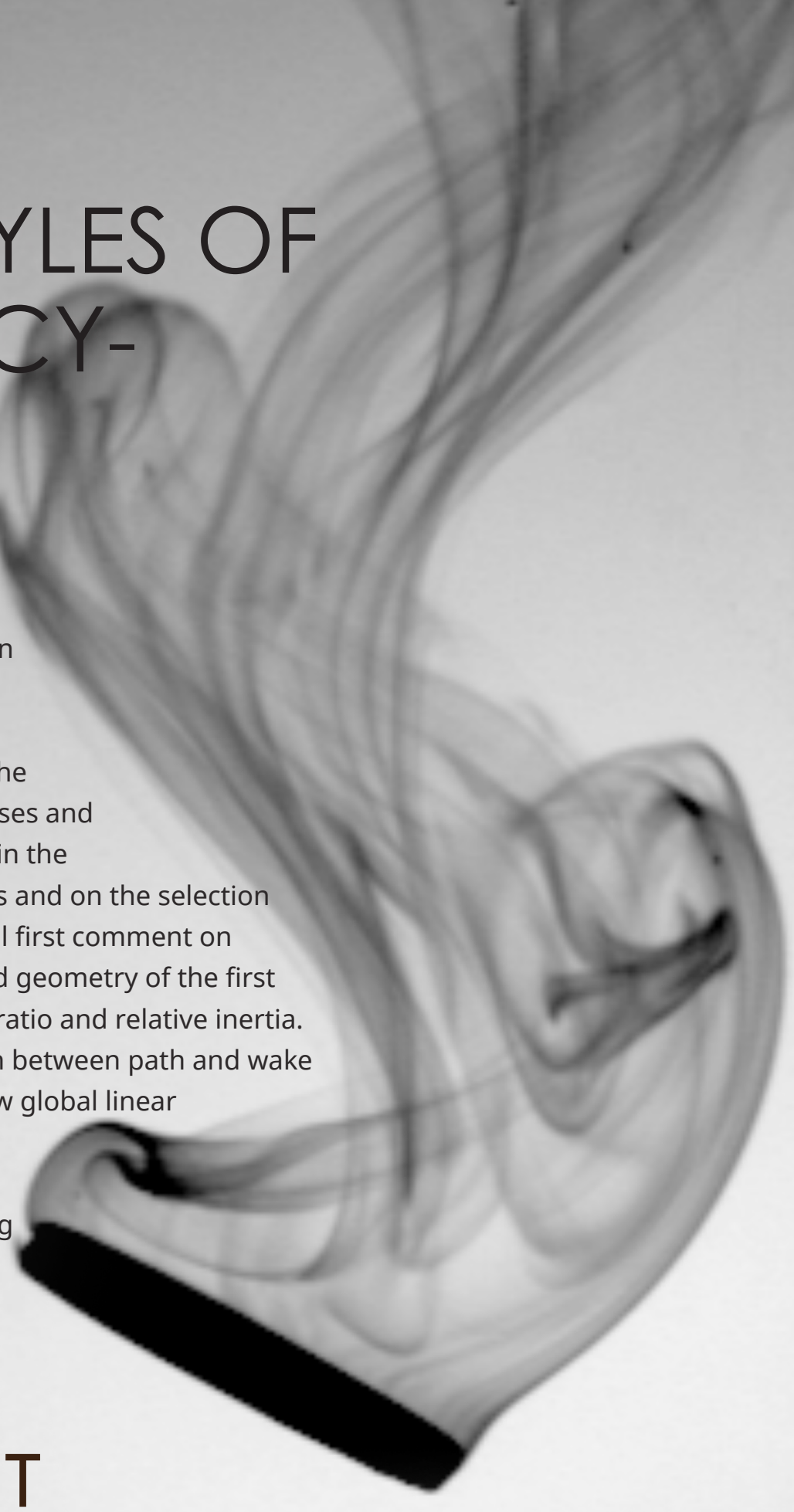
ICTS DISTINGUISHED LECTURE

FALLING/RISING STYLES OF GRAVITY/BUOYANCY-DRIVEN DISKS



Rigid disks falling under the effect of gravity, such as coins in water or confettis in air, mayexhibit a large variety of paths: they may fall vertically, follow planar zigzags, tumble, etc. The selection of these paths depends on the disk's inertia with respect to the surrounding fluid,on its geometrical aspect ratio and on the ratio between gravitational and viscous effects acting on it. Recently, the combination of well-controlled experiments, linear stability analyses and direct numerical simulations has resulted in significant progress in the understanding of the onset of the path instability of these objects and on the selection of their successive styles of fall or rise. During this seminar, I shall first comment on some experimental observations and then discuss the nature and geometry of the first non-vertical regimes of fall/rise as a function ofthe disks' aspect ratio and relative inertia. I shall also show that that there is in general no direct connection between path and wake instability. From a methodological view point, I shall illustrate how global linear stability approaches and direct numerical simulations nicely complement each other to reveal the dynamics of this class of bodies, and more generally to help us improve our understanding of instabilities in fluid-structure interactions problems.

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