

Manneville, P.

From chaos to turbulence in fluid dynamics. (English) [Zbl 0744.76068](#)
Engineering applications of dynamics of chaos, CISM Courses Lect. 319, 67-137 (1991).

[For the entire collection see [Zbl 0741.00036](#).]

The transition to turbulence is a wide subject impossible to set out in few lectures. Here we review some selected topics and, in each case, present a small set of experiments chosen to bring into light a new facet of the problem. Chapter 1 is mainly devoted to setting the general frame, introducing indispensable prerequisites about instability mechanisms, discussing briefly the roles of confinement in closed flows and advection in open flows, and outlining specific difficulties involved in case of “direct” transition to turbulence. In Chapter 2 we consider “plain convection” best illustrating the connection between chaos and turbulence. Then we turn to extended systems where key-words are modulations and patterns. This presentation is further completed by a brief introduction to convection in binary mixtures (Chapter 3) and centrifugal instabilities (Chapter 4). At last we examine plane parallel shear flows (Chapter 5).

MSC:

- [76F20](#) Dynamical systems approach to turbulence
- [76F10](#) Shear flows and turbulence
- [76E05](#) Parallel shear flows in hydrodynamic stability
- [76-02](#) Research exposition (monographs, survey articles) pertaining to fluid mechanics

Cited in **3** Documents

Keywords:

[transition to turbulence](#); [instability mechanisms](#); [convection](#); [chaos](#); [modulations](#); [patterns](#); [binary mixtures](#); [centrifugal instabilities](#); [plane parallel shear flows](#)