



## David Müller-Bender

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### Laminar chaos in systems with time-varying delay

For many systems arising in nature and engineering, the influence of time-delays cannot be neglected. Due to environmental fluctuations that affect the delay generating processes such as transport processes, the delays are in general not constant but rather time-varying. Although it is known that variable delays can lead to interesting phenomena, their effect on the dynamics of systems is not completely understood. In this talk, it is demonstrated that a temporal delay variation can change the dynamics of a time-delay system drastically. A recently discovered type of chaos called laminar chaos is introduced, which can only be observed for a certain type of time-varying delays. It is characterized by nearly constant laminar phases with periodic duration, where the intensity of the laminar phases varies chaotically from phase to phase. In contrast to the high-dimensional turbulent chaos, which is also observed for constant delay, laminar chaos is low-dimensional. Furthermore, it is shown experimentally and theoretically that laminar chaos is a robust phenomenon. A time-series analysis toolbox for its detection is provided, which is benchmarked by experimental data and by time-series of a nonlinear delayed Langevin equation.

The Seminar will take place online via Zoom as part of the Oberseminar “Nonlinear Dynamics” organized by Bernold Fiedler (FU Berlin), Isabelle Schneider (FU Berlin), Eckehard Schöll (TU Berlin) and Matthias Wolfrum (WIAS). For information on how to access the event, please contact any of the above or: [henning.reinken@itp.tu-berlin.de](mailto:henning.reinken@itp.tu-berlin.de)

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