

# Periodic solutions to non-autonomous incompressible fluid flow problems

Anton Seyfert

*Fachbereich Mathematik, Technische Universität Darmstadt, Germany.*

*seyfert@mathematik.tu-darmstadt.de*

## Abstract

We consider existence of time-periodic solutions to certain non-autonomous linear and semilinear differential equations for incompressible fluids. In particular, we show that the Navier-Stokes equations in an exterior domain with a time-periodic viscosity and exterior force admit a periodic solution. Afterwards we give an abstract generalization of the used method. Our approach is based on an extension of results by Yamazaki [2] and Geissert, Hieber, Nguyen [1].

**Keywords:** Navier-Stokes-flow, non-autonomous differential equations, periodic solutions

## References

- [1] M. Geissert, M. Hieber, H. Nguyen, A general approach to time periodic incompressible viscous fluid flow problems. *Arch. Rational Mech. Anal.* **220** (2016), 1095-1118.
- [2] M. Yamazaki, The Navier-Stokes equations in the weak- $L^n$  space with time-dependent external force, *Math. Ann.*, **317** (2000), 635-675.