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Computing the numerical solution to functional differential equations: some recent progresses towards E. Hopf's 1952 dream DANIELE VENTURI, University of California Santa Cruz — The fundamental importance of functional differential equations has been recognized in many areas of mathematical physics, such as fluid dynamics, quantum field theory and statistical physics. For example, in the context of fluid dynamics, the Hopf characteristic functional equation was deemed by Monin and Yaglom to be "the most compact formulation of the turbulence problem", which is the problem of determining the statistical properties of the velocity and pressure fields of Navier-Stokes equations given statistical information on the initial state. However, no effective numerical method has yet been developed to compute the solution to functional differential equations. In this talk I will provide a new perspective on this general problem, and discuss recent progresses in approximation theory for nonlinear functionals and functional equations. The proposed methods will be demonstrated through various examples.

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