

# Lie symmetry analysis of the Hopf functional-differential equation



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## LIE SYMMETRY ANALYSIS OF THE HOPF FUNCTIONAL-DIFFERENTIAL EQUATION

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GRIN Verlag Okt 2015, 2015. Taschenbuch. Book Condition: Neu. 210x148x3 mm. This item is printed on demand - Print on Demand Neuware - Masterarbeit aus dem Jahr 2015 im Fachbereich Ingenieurwissenschaften - Maschinenbau, Note: 1,0, Technische Universität Darmstadt (Fachbereich Maschinenbau, Fachgebiet für Strömungsdynamik, AG Turbulence theory and modelling), Sprache: Deutsch, Anmerkungen: Kommentar des Dozenten und Betreuers: 'Mit seiner Arbeit hat Herr Janocha wissenschaftliches Neuland betreten. In seiner Arbeit konnte Herr Janocha die mathematischen Hindernisse überwinden und erstmalig die notwendigen sehr aufwändigen und komplexen Rechnungen durchführen. Die Ergebnisse sind von fundamentaler Bedeutung für die Turbulenzforschung und seine Ergebnisse stellen die langfristige wissenschaftliche Basis des Problems der Hopf-Gleichung dar. Die Arbeit hat in einem extrem kurzen Review-Prozess sofort Einzug in die archivierte Literatur gefunden.', Abstract: In this paper, we extend the classical Lie symmetry analysis from partial differential equations to integro-differential equations with functional derivatives. We continue the work of OBERLACK and WACLAWCZYK (2006, Arch. Mech., 58, 597), (2013, J. Math. Phys., 54, 072901) where the extended Lie symmetry analysis is performed in the Fourier space. Here, we introduce a method to perform the extended Lie symmetry analysis in the physical space where we have to deal with the transformation of the integration variable in the appearing integral terms. The method is based on the transformation of the product  $y(x)dx$  appearing in the integral terms and applied to the functional formulation of the viscous Burgers equation. The extended Lie symmetry analysis furnishes all known symmetries of the viscous Burgers equation and is able to provide new symmetries associated with the Hopf formulation of the viscous Burgers equation. Hence, it can be employed as an important tool for applications in continuum mechanics. 40 pp. Deutsch.



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