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Fuzzy solution of homogeneous heat equation having solution in Fourier series form

U. M. Pirzada[1] · **D. C. Vakaskar[2]**

Abstract While solving practical problems, we often come across situations where the system involves fuzziness. The mathematical models resulting in partial differential equations, involve fuzzy parameters and variables. In available literature, methods are presented mainly for solving non-homogeneous fuzzy partial differential equations (see Allahviranloo in Comput Methods Appl Math 2(3):233–242, 2002; Allahviranloo and Taheri in Int J Contemp Math Sci 4(3):105–114, 2009; Allahviranloo and Afshar in Iran J Fuzzy Syst 7(3):33–50, 2010; Allahviranloo et al. in Appl Soft Comput 11:2186–2192, 2011). We present a method to find the solution of homogeneous fuzzy heat equations with fuzzy Dirichlet boundary conditions. We consider the fuzziness in zero in the homogeneous equation as well as in the boundary conditions. The initial conditions are also in fuzzy form. Further, we study the solution of fuzzy heat equation when the fuzzy initial conditions are represent as a Fourier series.

1 Introduction

Study of fuzzy partial differential equations (FPDEs) means the generalization of partial differential equations (PDEs) in fuzzy sense.

✉ U. M. Pirzada
salmapirzada@yahoo.com

D. C. Vakaskar
dcvakaskar@gmail.com

[1] School of Science and Engineering, Navrachana University of Vadodara, Vadodara 391410, India

[2] Department of Applied Mathematics, Faculty of Technology and Engineering, M.S.University of Baroda, Vadodara 390001, India

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