Solution of parabolic partial differential equation of the form ut = uxx + f(x; t) u using lie symmetry analysis

The investigation of the exact solutions of nonlinear PDEs plays an important role in the study of nonlinear physical phenomena for instance in shallow water waves, uid physics, general relativity and many others.Lie Symmetry analysis has played a signicant role in the construction of exact solutions to nonlinear partial di_erential equations (PDEs). The modern approach for _nding special solutions of systems of nonlinear PDEs was pioneered by Sophus Lie at the end of the nineteenth century. A variety of methods have been developed in the past few years by Ovsyannikov, Ibragimov and others. An attempt was made by Al-Nassar in obtaining solution of second order parabolic partial di_erential equa-tion of the form ut = uxx+f(x; t)u using non classical symmetry analysis.He investigated the use of classical and nonclassical symmetry methods on the second order parabolic PDE of the form ut = uxx+f(x; t)u, where he used various values of f(x; t), there after determined the symmetries and then used them to reduce the order and to solve the equation. In this work, we have focussed on the solution of the parabolic partial di_eren-tial equation ut = uxx + f(x; t)u with f(x; t) set as xt and sin xt using Lie symmetry analysis. This has been achieved through the development of in_nitesimal transformations, generators, prolongations and the invari-ant transformations of the problem. This is a big contribution to the knowledge and further research.