On group classification of nonlinear heat equation: algebraic approach

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In the present talk, we will revisit the problem of complete group classification of the class of (1+1)-dimensional nonlinear evolution equations $u_t = H(u_{xx})$, where $u_t = \frac{\partial u}{\partial t}$, $u_{xx} = \frac{\partial^2 u}{\partial x^2}$, and H is an arbitrary smooth function of u_{xx}. This problem was firstly considered by Akhatov, Gazizov and Ibragimov in the famous paper [1, Section 4] in the framework of the classical infinitesimal approach. In our modified classification procedure, we have used the specific structure of Lie symmetries of the evolution equations for involving the classical Lie theorem on realizations of Lie algebras by vector fields on the line. Previously, the Lie theorem has already been applied to the group classification of different classes of both ordinary and partial differential equations (see, e.g., [2, 3] and references therein). This approach has substantially simplified the proof of the classification results and, in particular, we have made the solution of the classifying equations easier.

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