

Numerical Analysis of Nonstationary Dissipative Structures and Waves in Highly Intensive Temperature Fields

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The quasilinear heat transfer equation with a source term

$$u_t = \sum_{i=1}^N (u^{\sigma_i} u_{x_i})_{x_i} + u^\beta, \quad \sigma_i > 0, \quad \beta > 1$$

is considered. In spite of its being of a special kind, it possesses different symmetries and as a consequence, it has many different invariant solutions or self-similar solutions. These solutions describe the various dissipative structures and waves that may arise and which are preserved in the corresponding temperature field. Numerical analysis of the structural stability or meta-stability of these various types of self-similar solutions is carried out for a number of space dimensions n , geometries and values of the parameters. The numerical techniques used will be discussed.