

"THE SYMMETRY OF FINITE-DIFFERENCE EQUATIONS"

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Attempts of adaptation of the group analysis of differential equations to finite-difference equations were failed because of nonlocal nature of finite-difference operators. Therefore some authors applied preliminary localisation replacing the finite-difference equations by various differential approximations.

The first steps towards the group analysis of the finite-difference equations are made in the present work.

The formal transformations groups in the space of differential and mesh variables are considered. It is shown that the conservation of the difference derivatives sense tends necessarily to the Lie-Backlund groups. One of them - the Taylor group is used obtaining the formulas of transformations of mesh variables. The criterion of invariance and uniform conservation of the difference mesh is stated. The criterion of invariance for difference equations is applied for obtaining the finite-difference equations allouring the group isomorphic to the natural differential model group.

The group isomorphic to the Taylor group is constructed by means of formal Newton series. This group is applied for factorization of Lie-Backlund operators on uniform mesh. The discrete Noeter identity for some classes of group transformations is obtained, and the conservation criterion of invariance equations is settled.