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GEOMETRY SPLITTING OF NONLINEAR SYSTEMS OF DIFFERENTIAL EQUATIONS INTO BLOCKS

A N KOVANTSOVS♥

Riga Technical University
Kaļķu iela 1, Riga, LV-1658, 1, Latvia

ABSTRACT

Both in theory and in many practical issues, a crucial role is played by the problem of solving systems of ordinary differential equations. One of these problems is the decomposition of the system of equations in blocks, i.e. in such a subsystem, each of which comprises a minimal number of unknown functions, both incoming and under the sign of the derivative and the right sides. Therefore, natural formulation of the problem of finding ways to convert these systems to splitting mind. For systems of linear equations, this problem is solved quite simply. This is tantamount to bringing the system matrix to Jordan form. Each cell corresponds to a Jordan block split system. However, the geometry of this splitting completely investigated $A = \pi r^2$.

Keywords: ordinary differential equations, decomposition, splitting mind, linear equations

1 GENERAL

For splitting system of nonlinear differential equations into blocks is proposed to use a special matrix - nonlinear projectors. System is the set of non-linear projections degenerate matrices P_i, satisfying $P_i^2 = P_i$, $P_i P_j = 0$, $\sum_{i=1}^{n} P_i = E$. Let a system of nonlinear differential equations $\frac{dy^i}{dt} = f^i(y^j)$ (1). Let via non-singular transformation $y^i = F^i(z^j)$ system leads to splitting an

$$\begin{cases} \frac{dz^{i_1}}{dt} = f_1^{i_1}(z^{j_1}), & i_1 j_1 = 1, \dots, s_1, \\ \frac{dz^{i_2}}{dt} = f_2^{i_2}(z^{j_2}), & i_2, j_2 = s_1 + 1, \dots, s_1 + s_2, \\ \text{-----------------------------} & \\ \frac{dz^{i_p}}{dt} = f_p^{i_p}(z^{j_p}), & i_p, j_p = s_1 + s_2 + \dots + s_{p-1} + 1, \dots, s_1 + \dots s_p. \end{cases}$$

No degenerate transformation (1) split into p degenerate transformations, each of which binds a singular matrix transformation. Requirements that these matrices were projectors lead to a system of differential equations for the coefficients of the transformation (1). This system is completely enterable. Thus, the non-singular transformation, resulting in a system of differential equations to cleaved mind generates a system of projectors, and vice versa. If the unknown functions of the system of equations taken as coordinates of points in the n - dimensional projective space, the system of projectors acting on this system, forms in this space the collection of surfaces forming the projecting network. It turns out that the network is projecting net migration. Each such a network can be defined by some 2-valent tensor. In the case of projection-splitting system for the two-dimensional case is defined twice covariant tensor projecting Network Projector splitting.

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♥***Corresponding author*** e-mail akovancova@baltinet.lv