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Generalizations of L. S. Pontryagin's lemma concerning squares. (English. Russian original)

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Differ. Equations 20, 1118-1123 (1984); translation from Differ. Uravn. 20, No. 9, 1548-1555 (1984).

The aim of this note is to extend the following result called Pontryagin's lemma concerning squares. Let $\phi_i(.)$ $(i = 1, ..., m)$ be a linearly independent system of real scalar functions, defined and analytic on [0,1]; $\Sigma = \{\phi(.)|\ \phi(.) = \sum_{i=1}^{m} c_i\phi_i(.),\ c_i \in \mathbb{R}^1\}$ is the family of functions spanned by the $\phi_i(.)$; $\Pi = \{(x_1, x_2)|\ a \le x_1 \le a + d,\ b \le x \le b + d\}$ is the given square in $\mathbb{R}^2$; $\psi(t) = [\psi_1(t)t^{-k_1},\ \psi_2(t)t^{-k_2}]$, $t \in (0, 1]$, is a curve in $\mathbb{R}^2$, where $\psi_1(\cdot)$, $\psi_2(\cdot) \in \Sigma$; k_1, k_2 are non-negative integers. Then, there is a constant $d_1 > 0$ such that there is a square $\Pi_1 \subset \Pi$ with side d_1 which the curve ψ (t), $t \in (0, 1]$, does not intersect.

The author extends this result and applies it to special classes of nonanalytic functions, namely to the case when components $\psi_1(t)$ and $\psi_2(t)$ of the curve ψ (t), $t \in (0, 1]$, are solutions of a differential equation of a special type.

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91A23 Differential games (aspects of game theory)

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Pontryagin's lemma concerning squares; nonanalytic functions