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$$\int_{G_A} (\dot{x}_i(t) - f_i(t, \psi(t))) dt = \int_{G_A \cap T''} (\dot{x}_i(t) - f_i(t, \psi(t))) dt + \\ + \int_{G_A - T''} (\dot{x}_i(t) - f_i(t, \psi(t))) dt \geq \int_{G_A \cap T''} \varepsilon_t dt + \int_{G_A - T''} s_i(t) dt$$

holds for every $\psi(t)$ satisfying (1), (2), (3), (5) (cf. (18), (21)). The inequality (19) implies

$$(22) \quad \int_{G_j} (\dot{x}_i(t) - f_i(t, \psi(t))) dt > b' > 0 \quad \text{for every } \psi(t)$$

satisfying (1), (2), (3), (5). We assume that $x(t)$ is V -solution. Therefore for a given $\varepsilon > 0$, $\varepsilon < \min(1/k, \frac{1}{2}b')$ and $N \subset G$, $\mu(N) = 0$ there exists a function $\psi(t)$ satisfying (1)–(5). Let $\hat{\psi}(t)$ satisfy the properties (1), (2), (3), (5). Denoting $\varphi(t) = \dot{x}_i(t) - f_i(t, \hat{\psi}(t))$ we can write the last inequality (22) in the form $\int_{G_j} \varphi(t) dt > b' > 0$. Let $G_j = (\tau_1, \tau_2) \subset T$. Now due to (4) $|\int_{\tau_1}^{\tau_1} \varphi(\tau) d\tau| < \varepsilon$ must hold for τ_1 , hence $-\varepsilon < \int_{\tau_1}^{\tau_1} \varphi(\tau) d\tau < \varepsilon$ and $\int_{\tau_1}^{\tau_2} \varphi(\tau) d\tau = \int_{\tau_1}^{\tau_1} \varphi(\tau) d\tau + \int_{\tau_1}^{\tau_2} \varphi(\tau) d\tau > \int_{\tau_1}^{\tau_1} \varphi(\tau) d\tau + b' > -\varepsilon + b' > \varepsilon$ holds because the value $\varepsilon > 0$ was defined in (20) so that $2\varepsilon < b'$. The inequality $|\int_{\tau_1}^{\tau_2} \varphi(\tau) d\tau| < \varepsilon$ does not hold for τ_2 which is a contradiction to the inequality (4).

This contradiction completes the proof of the theorem.

References

- [1] *Filippov A. F.*: Дифференциальные уравнения с разрывной правой частью, Математический сборник, 1960, Т. 51 (93), № 1, 99–128.
- [2] *Viktorovskij E. E.*: Об одном обобщении понятия интегральных кривых для разрывного поля направлений, Математический сборник, 1954, Т. 34 (76), № 2, 213–248.

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