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ON TRANSITIONAL SOLUTIONS OF SECOND ORDER NONLINEAR DIFFERENTIAL EQUATIONS

We consider the differential equation

$$u'' = f(t, u, u'), \tag{1}$$

where $f : R \times [0, 1] \times R \to R$ is a continuous function such that $f(t, 0, 0) = f(t, 1, 0) = 0$ for $t \in R$, and for this equation we study the problem on the existence of at least one so-called transitional solution, i. e. a solution satisfying the conditions

$$\lim_{t\to-\infty} u(t) = 0, \quad \lim_{t\to+\infty} u(t) = 1, \quad 0 \le u(t) \le 1 \quad \text{for} \quad t \in R. \tag{2}$$

On the basis of I. Kiguradze's theorem from [1] new and in a certain sense optimal conditions are obtained for the solvability of problem (1), (2). Some of these results generalize the previous ones from [2] and [3].

References

1. I. T. Kiguradze and B. L. Shekhter, Singular boundary value problems for second-order ordinary differential equations. (Russian) *Itogi Nauki i Tekhniki, Sovrem. Probl. Mat., Noveĭshie Dostizh.* **30**(1987), 105–201; translated in *J. Soviet Math.* **43**(1988), No. 2, 2340–2417.

2. Yu. A. Klokov, Boundary value problems with a condition at infinity for equations of mathematical physics. (Russian) *Riga*, 1963.

3. L. Malaguti and C. Marcelli, Heteroclinic orbits in plane dynamical systems. *Arch. Math.* (*Brno*) **38**(2002), No. 3, 183–200.