Further Ultimate Boundedness of Solutions of some System of Third Order Nonlinear Ordinary Differential Equations

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Abstract

In this paper, we shall give sufficient conditions for the ultimate boundedness of solutions for some system of third order non-linear ordinary differential equations of the form

$$\dddot{X} + F(\ddot{X}) + G(\dot{X}) + H(X) = P(t, X, \dot{X}, \ddot{X})$$

where $X, F(\ddot{X}), G(\dot{X}), H(X), P(t, X, \dot{X}, \ddot{X})$ are real n-vectors with F, G, $H : \mathbb{R}^n \to \mathbb{R}^n$ and $P : \mathbb{R} \times \mathbb{R}^n \times \mathbb{R}^n \times \mathbb{R}^n \to \mathbb{R}^n$ continuous in their respective arguments. We do not necessarily require that $F(\ddot{X}), G(\dot{X})$ and $H(X)$ are differentiable. Using the basic tools of a complete Lyapunov Function, earlier results are generalized.

Key words: Ultimate boundedness, complete Lyapunov functions, nonlinear third order system.

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