

Lyapunov stability of singular planar systems related to dispersion-managed solitons in optical fiber

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Abstract

In this paper, we consider two singular planar differential systems which can describe the evolution of the optical pulse width and chirp for the so-called dispersion-managed solitons. Based on the method of third order approximation in combination with some quantitative information obtained by the upper-lower solutions method and the averaging method, some results on the existence and Lyapunov stability of the periodic solutions are obtained. Moreover, the formula of the first twist coefficient and a stability criterion of a nonlinear differential equation are also established.

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