

Canards Existence in the Hindmarsh–Rose Model



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Abstract In two previous papers, we have proposed a new method for proving the existence of “canard solutions” on one hand for three- and four-dimensional singularly perturbed systems with only one *fast* variable and, on the other hand, for four-dimensional singularly perturbed systems with two *fast* variables; see [4, 5]. The aim of this work is to extend this method, which improves the classical ones used till now to the case of three-dimensional singularly perturbed systems with two *fast* variables. This method enables to state a unique generic condition for the existence of “canard solutions” for such three-dimensional singularly perturbed systems which is based on the stability of *folded singularities* (*pseudo singular points* in this case) of the *normalized slow dynamics* deduced from a well-known property of linear algebra. Applications of this method to a famous neuronal bursting model enables to show the existence of “canard solutions” in the Hindmarsh–Rose model.

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