

Periodic Solutions of Asymptotically Linear Hamiltonian Systems without Twist Conditions

Rong Cheng^{a,b} and Dongfeng Zhang^b

^a College of Mathematics and Physics, Nanjing University of Information Science and Technology, Nanjing 210044, China

^b Department of Mathematics, Southeast University, Nanjing 210096, China

Reprint requests to R. C.; E-mail: mathchr@163.com

Z. Naturforsch. **65a**, 445 – 452 (2010); received April 6, 2009 / revised September 15, 2009

In dynamical system theory, especially in many fields of applications from mechanics, Hamiltonian systems play an important role, since many related equations in mechanics can be written in an Hamiltonian form. In this paper, we study the existence of periodic solutions for a class of Hamiltonian systems. By applying the Galerkin approximation method together with a result of critical point theory, we establish the existence of periodic solutions of asymptotically linear Hamiltonian systems without twist conditions. Twist conditions play crucial roles in the study of periodic solutions for asymptotically linear Hamiltonian systems. The lack of twist conditions brings some difficulty to the study. To the authors' knowledge, very little is known about the case, where twist conditions do not hold.

Key words: Periodic Solutions; Hamiltonian Systems; Galerkin Approximation Methods; Critical Point Theory; Variational Approaches.

AMS Subject Classification (2000): 34C25, 58E50