Topological **M**ethods in **N**onlinear **A**nalysis
Volume 57, No. 1, 2021, 73–87
DOI: 10.12775/TMNA.2020.032

MINIMAL PERIODIC PROBLEM FOR BRAKE ORBITS OF FIRST-ORDER HAMILTONIAN SYSTEMS

Xiaofei Zhang — Chungen Liu — Xinnian Lu

Abstract. In this paper, with the aid of L_0-index iteration theory, the minimal period estimates are considered on brake orbits of nonlinear N-symmetric Hamiltonian systems with a mild superquadratic growth condition.

1. Introduction

In this paper, we consider the brake orbit problem of the following autonomous Hamiltonian system:

$$\begin{cases} \dot{z}(t) = J\nabla H(z(t)), \\ z(-t) = Nz(t), \qquad\qquad t \in \mathbb{R},\ \tau > 0, \\ z(t+\tau) = z(t), \end{cases} \tag{1.1}$$

where $H \in C^2(\mathbb{R}^{2n}, \mathbb{R})$ is N-symmetric, i.e., $H(z) = H(Nz)$, for all $z \in \mathbb{R}^{2n}$, $N = \left(\begin{smallmatrix} -I_n & 0 \\ 0 & I_n \end{smallmatrix}\right)$ and $J = \left(\begin{smallmatrix} 0 & -I_n \\ I_n & 0 \end{smallmatrix}\right)$ with I_n being the $n \times n$ identity matrix.

2020 *Mathematics Subject Classification.* 58E05, 34C25, 70H05.

Key words and phrases. Hamiltonian system; brake orbit; L_0-index; minimal periodic problem.

The first author is supported by the Youth Fund Programs of the Science and Technology Department in Shanxi (Grant No. 201901D211430), the Scientific and Technological Innovation Programs of Higher Education Institutions in Shanxi (Grant No. 2019L0766) and the Doctoral Scientific Research Foundation of Shanxi Datong University.

The second author is the corresponding author and is partially supported by the NSF of China (11790271), Guangdong Basic and Applied basic Research Foundation (2020A1515011019), Innovation and Development Project of Guangzhou University.