Topological **M**ethods in **N**onlinear **A**nalysis
Volume 55, No. 2, 2020, 617–653
DOI: 10.12775/TMNA.2019.108

© 2020 Juliusz Schauder Centre for Nonlinear Studies
Nicolaus Copernicus University in Toruń

SPECTRAL NUMBERS AND MANIFOLDS WITH BOUNDARY

Jelena Katić — Darko Milinković — Jovana Nikolić

Abstract. We consider a smooth submanifold N with a smooth boundary in an ambient closed manifold M and assign a spectral invariant $c(\alpha, H)$ to every singular homological class $\alpha \in H_*(N)$ and a Hamiltonian H defined on the cotangent bundle T^*M. We also derive certain properties of spectral numbers, for example we prove that spectral invariants $c_\pm(H, N)$ associated to the whole Floer homology $HF_*(H, N : M)$ of the submanifold N, are the limits of decreasing nested family of open sets.

1. Introduction

1.1. Floer Homology for submanifold with boundary. Let N be a compact submanifold with a smooth boundary of an ambient closed manifold M. Consider a conormal bundle of ∂N, $\nu^*(\partial N)$, defined as

$$\nu^*(\partial N) = \{(\mathbf{q}, \mathbf{p}) \in T^*M \mid \mathbf{q} \in \partial N,\ \mathbf{p}|_{T_{\mathbf{q}}\partial N} = 0\},$$

which is a Lagrangian submanifold of the cotangent bundle T^*M. Let $\nu^*_-(\partial N)$ denote the negative part of the conormal bundle to the boundary:

$$\nu^*_-(\partial N) := \big\{(\mathbf{q}, \mathbf{p}) \in \nu^*(\partial N) \mid \mathbf{p}(\overrightarrow{n}) \geq 0,\ \text{for } \overrightarrow{n} \in TN \text{ inner normal to } \partial N\big\}$$

2020 *Mathematics Subject Classification.* Primary: 53D40; Secondary: 53D12, 57R58, 57R17.

Key words and phrases. Spectral numbers; Floer homology; Lagrangian submanifolds; manifolds with boundary.

This work is partially supported by Ministry of Education and Science of Republic of Serbia Project #ON174034.