

Lectures on Semi-Classical Analysis 2022

日時: 2022 年 9 月 2 日 (金) - 9 月 4 日 (日)

会場: セミナー&カルチャーセンター臨湖 第6会議室

プログラム

9月2日(金)

14:30-15:30 三上 溪太 (理化学研究所)

Introduction to the control of Schrödinger equation I

16:00-17:00 亀岡 健太郎 (東京大学)

Resonances generated by hyperbolic trapping and related topics I

9月3日(土)

10:00-11:00 樋口 健太 (愛媛大学)

Resonances of a Helmholtz resonator with a thin tube I

11:30-12:30 三上 溪太 (理化学研究所)

Introduction to the control of Schrödinger equation II

14:30-17:00 自由討論

9月4日(日)

10:00-11:00 亀岡 健太郎 (東京大学)

Resonances generated by hyperbolic trapping and related topics II

11:30-12:30 樋口 健太 (愛媛大学)

Resonances of a Helmholtz resonator with a thin tube II

アブストラクト

講演者: 三上 溪太

タイトル: Introduction to the control of Schrödinger equation

アブストラクト: This lecture course aims to introduce a brief introduction to the control of Schrödinger equation. The solvability of the control problem is related to an observability estimate. It is known that one can prove the observability from underlying geometry. Semiclassical analysis plays a significant role in this proof. We start by stating what a control problem is. We then prove the equivalence between the solvability of the control problem and the observability estimate. We will briefly review some notions from the semiclassical analysis. We will provide the proof of the observability estimate for the Laplace-Beltrami operator on the compact manifold with the geometric control condition. We will also introduce some recent results in this field.

講演者: 亀岡 健太郎

タイトル: Resonances generated by hyperbolic trapping and related topics

アブストラクト: In this talk, I review the semiclassical study of resonances generated by a hyperbolic trapping, which is studied in the context of quantum chaos. A basic paper in this direction is Nonnenmacher-Zworski (2009). I will explain the main ideas in this paper. I will also explain the connection with the study of the equidistribution of eigenfunctions in the chaotic setting by Anantharaman and others.

講演者: 樋口 健太

タイトル: Resonances of a Helmholtz resonator with a thin tube

アブストラクト: A sound is generated when one blows the top of an empty bottle. Such a phenomenon is called Holmholtz resonance. Mathematically, it is described as an exterior problem in the Euclidean space with a “bottle-shaped” obstacle. The real and imaginary part of a resonance are the frequency and inverse of half-life, respectively, of the corresponding vibrational mode.

In this talk, I review some works on asymptotic distribution of resonances in the limit when the width of the neck tends to zero. I explain the cause of some similarities with the resonances of 1D semiclassical Schrödinger operators. I also discuss the necessity of the assumption in Duyckaerts-Grigis-Martinez (2020) on the nodal set of an eigenfunction of the cavity.

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