

立命館大学幾何学セミナー

来る**8月24日（月）**に立命館大学幾何学セミナーが行われます。みなさまのご参加をお待ちいたしております。

日時：**2026年8月24日（月） 16:00-17:00**

開催方法：立命館大学びわこ・くさつキャンパス ウェストウィング6階談話会室での対面開催

Zoom ミーティングによる配信を予定。

Zoom にて講演に参加される場合、下記の URL よりご登録ください。ご登録いただいた電子メールアドレスへ、Zoom ミーティングの URL 等が自動で届きます。

<https://ritsumeit-ac-jp.zoom.us/meeting/register/ka0MS0JuRk2bEjqNFrq0g>

講演者：

Elmar Schrohe 氏 (Leibniz Universität Hannover)

タイトル：

Elliptic boundary value problems and partial group actions

アブストラクト：

We consider a smooth compact manifold with boundary, M , embedded in a smooth manifold of the same dimension on which an amenable group Γ acts by isometries. We do not assume M to be invariant under Γ . This results in a *partial action* of Γ on M° : For $g \in \Gamma$ we let $M_g^\circ = g(M^\circ) \cap M^\circ$ and obtain diffeomorphisms $g : M_{g^{-1}}^\circ \rightarrow M_g^\circ$.

We assume that any two images of ∂M under Γ either coincide or are disjoint and that only finitely many lie in M° . Their spherical blow-up yields a manifold Y with boundary consisting of finitely many components. Moreover, Y inherits a partial action of Γ .

We define the C^* -algebra $\overline{\Psi_\Gamma(Y, \partial Y)}$ of operators on $L^2(Y) \oplus L^2(\partial Y)$, generated by the algebra $\Psi(Y, \partial Y)$ of operators of order and type zero in Boutet de Monvel's

calculus on Y and partial isometries associated with the partial action. Denote by $\Sigma = \overline{\Psi(Y, \partial Y)} / \mathcal{K}$ the symbol algebra. If the partial action of Γ on the primitive ideal space of Σ is topologically free, we find a criterion for the Fredholm property of the operators in $\overline{\Psi_\Gamma(Y, \partial Y)}$.

We classify the elliptic elements in $\overline{\Psi_\Gamma(Y, \partial Y)}$ modulo stable homotopies. More precisely, we show that the Abelian group of stable homotopy classes of elliptic elements over $\overline{\Psi_\Gamma(Y, \partial Y)}$ acting between ranges of projections over the partial C^* -crossed product $C(Y \sqcup \partial Y) \rtimes \Gamma$ is isomorphic to the direct sum

$$K_0(C_0(T^*Y^\circ) \rtimes \Gamma) \oplus K_0(C(\partial Y) \rtimes \Gamma)$$

of K -groups of the partial C^* -crossed products with Γ . If Γ is finitely generated and of polynomial growth, then the elements associated with the second summand do not contribute to the index.

We finally study an algebra of transmission problems associated with the partial action of Γ . This is a C^* -algebra $\overline{\Psi_{\mathbb{Z}_2 \times \Gamma}(Y, \partial Y)}$ of Boutet de Monvel type operators together with transmission conditions at the interfaces created by the blow-up that can be encoded by an additional partial $\mathbb{Z}_2$ action. Again, we establish a Fredholm criterion and classify the elliptic elements modulo stable homotopy.

Although rather abstract, this research project is motivated by problems in mechanical engineering.

Joint work with Eske Ewert (Research Center Jülich) and Anton Yu. Savin (RUDN, Moscow)

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