Framed cobordism of systems of submanifolds in the classification of free quotients

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In this talk we will show how framed cobordism of systems of non-separating 2-sided submanifolds in a closed manifold can be used to classify epimorphisms onto free groups up to equivalence and strong-equivalence. Such a classification is known for surface groups and was done by Grigorchuk–Kurchanov–Zieschang by using other methods. We use an extended Pontryagin–Thom construction to associate for any system of submanifolds an induced homomorphism to a free group. We will present geometric operations on submanifolds which realize elementary Nielsen transformations on induced homomorphisms. These results are motivated by the notion of Reeb graph of a function on a manifold, which leads to both free quotient and system of submanifold.

The results are from joint work with Wacław Marzantowicz.

References

[1] R. I. Grigorchuk, P. F. Kurchanov and H. Zieschang, *Equivalence of homomorphisms of surface groups to free groups and some properties of 3-dimensional handlebodies*, Proceedings of the International Conference on Algebra, Part 1 (Novosibirsk, 1989), 521–530, Contemp. Math. 131, Part 1, Amer. Math. Soc., Providence, RI, 1992.

[2] W. Marzantowicz and Ł. P. Michalak, *Relations between Reeb graphs, systems of hypersufaces and epimorphisms onto free groups*, preprint (2020), arXiv:2002.02388.