# The Maz'ya Inequality

**Coordinator: Marcus Waurick**

In this project, we want to study the derivation of Maz'ya's inequality (formula (12.5) in the ISEM lecture notes), which has been used in Lecture 12 for the proof of Theorem 12.12. As our main tool we will use the proof given by Daniel Daners in his manuscript communicated to the participants.

To be more precise, we will concentrate on the first 12 pages of the notes given by Daners. The final aim of the project is to derive a more or less self-contained proof of Maz'ya's inequality. For doing so, we will also need to understand Sard's lemma (see e.g. [1, Theorem 3.6.3] or [2, Theorem 3.1.3]) and the isoperimetric inequality (formula (3.1) in Daners' notes). The latter asserts that given $N \geqslant 2$ there exists $c > 0$ such that for all measurable $\Omega \subseteq \mathbb{R}^N$ with finite Lebesgue measure $|\Omega|$, the inequality

$$|\overline{\Omega}|^{\frac{N-1}{N}} \leqslant c\mathcal{H}_{N-1}(\partial\Omega)$$

holds true. Here $\mathcal{H}_{N-1}$ is the $N-1$-dimensional Hausdorff measure, which has been defined in the ISEM lecture notes.

# References

[1] R. Abraham, J.E. Marsden, and T. Ratiu, *Manifolds, tensor analysis, and applications*, Springer, New York, 1988.

[2] M.W. Hirsch. *Differential topology.* Springer, New York, 1976.

E-mail: marcus.waurick@tu-dresden.de