Seminar: Fractal Geometry/Fraktale Geometrie

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The objective of this seminar is to introduce the students to the theory of fractals and its applications. This seminar is based on Falconer's wonderful book Falconer [Fal14]. Here is the plan of talks.

20.10.2021 Introduction and Planning. (Thomas Walpuski)

Theory.

27.10.2021 Box-counting dimension. (Dominik Gutwein)

[Fal14, §2]; WP: Minkowski–Bouligand dimension

3.11.2021 Hausdorff measure and dimension.

[Fal14, §1.3 and §3]; WP: Hausdorff dimension

10.11.2021 Tools and techniques for calculating dimensions.

[Fal14, §4]

17.11.2021 Local structure of fractals.

[Fal14, §5]

24.11.2021 Projections and products of fractals.

[Fal14, §6 and §7]

1.12.2021 Generic intersections of fractals.

[Fal14, §8]

Applications and Examples.

8.12.2021 Iterated functions systems I.

[Fal14, §9.1-9.3]

15.12.2021 Iterated functions systems II.

[Fal14, §9.4-9.6]

5.1.2022 Applications in number theory.

[Fal14, §10]

12.1.2022 Fractal graphs of functions.

[Fal14, §11]

19.1.2022 The Kakeya problem, Vitushkin's conjecture, convex functions, and fractal groups.

[Fal14, §12]

26.1.2022 Discrete dynamical systems.

[Fal14, §13.1-13.4]

2.2.2022 Continuous dynamical systems.

[Fal14, §13.5-13.7]

9.2.2022 Julia sets and the Mandelbrot set I.

[Fal14, §14.1-14.2]

16.2.2022 Julia sets and the Mandelbrot set II.

[Fal14, §14.3-14.5]

References

[Fal14] K. Falconer. *Fractal geometry. Mathematical foundations and applications.* 2014. MR: 3236784. Zbl: 1285.28011 (cit. on pp. 1, 2)