TUE/P3
11:00–11:20

Extending Immersions to the Sphere

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Extending functions is a well known problem in mathematics and arises in many different subjects. Most of the existing results gave a solution for the existence of such extensions, like the Theorem of Hahn-Banach or the analytic extension in complex analysis, but not to the question how many different extensions exists.

We regard the problem for a generic immersion $f : \partial M \to N$ between two surfaces M and N and ask: *When can f be extended to a generic immersion $F : M \to N$?*

A first solution for that problem was presented by *C. J. Titus* in 1961 [2], when he solved it for $M = \overline{D}^2$ and $N = \mathbb{R}^2$. In 1967 *S. J. Blank* [1] had a look on the same surfaces as Titus, but he presented a totally new approach to the problem. He introduced an algorithm which results in a word $w(f)$ for each generic immersion $f : \partial\overline{D}^2 \to \mathbb{R}^2$. He can gave the answer wether f can be extended to a generic immersion $F : \overline{D}^2 \to \mathbb{R}^2$ only by analyzing the structure of the word $w(f)$. Further more his approach leads to a solution of the question: *How many different extensions exists?*

We will see how this algorithm works and which adaption should be made to give the solution for the case of a generic immersion $f : \partial\overline{D}^2 \to \mathbb{S}^2$.

[1] S. J. BLANK: Extending immersions and regualar homotopies in codimension 1, *PhD Thesis at Brandeis University* (1967)

[2] C. J. TITUS: The combinatorial topology of analytic functions on the boundary of a disc, *Acta Math.* **106** (1961), 45–64.