



DYNAMICAL SYSTEMS SEMINAR

Hopf's Invariant

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Abstract. In 1930 Heinz Hopf gave the first example of a map $S^3 \rightarrow S^2$ non-homotopic to a constant by exploring the fact that its fibers are linked curves. More precisely, he considered the linking number of the fibers: the so-called Hopf invariant. In this lecture we will define this invariant and explore its properties to prove Hopf's result. Our purpose is to make the argumentation as geometric and intuitive as possible. For this, we will introduce the linking number and Brouwer degree as a generalization of the winding number of curves in the plane and we will use their invariance by homotopy and cobordism.

Referências

- [1] SAMELSON, H.: $\pi_3(S^2)$, *H. Hopf, W. K. Clifford, F. Klein*, In: History of Topology. Elsevier Science, 1999. p. 575–578.
- [2] MILNOR, J.: *Topology from the Differentiable Viewpoint*, University Press of Virginia, 1995.
- [3] KOSINSKY, A.: *Differential Manifolds*, Academic Press, 1993.

More info at the WhatsApp group of the Dynamical Systems Seminar:
<https://chat.whatsapp.com/HbF8Gf4Vz05FP32oI8lxoJ>