

Dienstag, 20. Januar 2015, 10:00 Uhr, 1008/L1

Meru Alagalingam, Ingo Blechschmidt:
A gentle introduction to the Leray spectral sequence



Jean Leray - Parc de Sceaux (1985)

“In the late 1940s and early 1950s all of us were studying Leray’s papers to try to understand how he got the marvelous results he claimed. To be perfectly frank, I never got to first base in this enterprise, it was very frustrating. Leray was a horrible expositor.” – Bill Massey

The results Massey refers to are the numerous applications of the Leray spectral sequence, which Leray invented in the 1940s. This is an algebraic tool which, given any continuous map $f : X \rightarrow Y$ (not necessarily a bundle or fibration), relates the cohomology of the base space Y , the total space X , and the fibers of f . To this end, Leray had to introduce sheaves and sheaf cohomology.

The talk will give an introduction to the Leray spectral sequence, setting up only those concepts of sheaf theory and homological algebra which are strictly needed for the task. Many examples will illustrate its use. Along the way, we will also understand the conceptual background of the Mayer–Vietoris sequence and its generalization to coverings consisting of more than two sets.

Basic familiarity with algebraic topology is required, but no prior exposure to sheaves and spectral sequences is assumed. After the talk, you will have the working knowledge to apply the Leray spectral sequence in your studies.

