Friday 8 November 2019 – at 3.00 p.m.
Seminar Room “-1” – Department of Mathematics

Marco Spadini
(Università di Firenze)

A topological approach to local invertibility of PC\(^1\) maps and to global invertibility of piecewise-linear maps

Abstract:
By known results of Pang/Ralph and Kuntz/Sholtes the local invertibility for a class of PC\(^1\) maps can be characterized in terms of the (global) invertibility of what we may call the piecewise linearization. We focus on the problem of invertibility of strongly piecewise linear (SPL) maps. That is, given a decomposition of \(\mathbb{R}^n\) in a finite number \(k\) of polyhedral cones with common vertex at the origin, an SPL is a continuous map that coincides with a (different) linear map on each cone in the decomposition. By a result of Sholtes, an SPL can only be invertible if it is nondegenerate, i.e., if the signs of the involved linear maps are coherent. A theorem of Pang/Ralph characterizes the invertibility of nondegenerate SPLs in terms of their topological degree. Such degree can be estimated by \((n - 1)\)-dimensional surface integrals yielding the curious result that a nondegenerate SPL with \(k \leq 3\) (or \(k \leq 4\) if all cones are convex) is always invertible. Other less “geometric” estimates, based on volume integration, that yield different invertibility results will be discussed.

Contact person: Marco Sabatini