

# Poincaré-Reeb graphs of real algebraic domains

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## Abstract

A *real algebraic domain* is a closed topological subsurface of a real affine plane such that its boundary consists of disjoint smooth connected components of real algebraic plane curves. Our goal is to study the *non-convexity* of real algebraic domains relative to the vertical direction. To this end, we collapse all vertical segments contained in the algebraic domain, yielding a *Poincaré-Reeb graph* which is naturally transversal to the foliation by vertical lines.

Our main result is the following: any transversal graph whose vertices have only valencies 1 and 3 and are situated on distinct vertical lines arises up to isomorphism as a Poincaré-Reeb graph of a real algebraic domain. We also give a purely topological description of the setting in which our construction of Poincaré-Reeb graphs may be applied, with no differentiability assumptions.

This is a joint work with Arnaud Bodin and Patrick Popescu-Pampu (Université de Lille, France).