Cusp cobordism of Morse functions

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In the mid 1950s, René Thom reduced the study of cobordism groups of embedded manifolds to the computation of homotopy groups of certain Thom complexes. Stable homotopy theory has been essential for the study of cobordism groups of smooth maps with prescribed singularities ever since. On the other hand, more explicit geometric methods of global singularity theory can be applied to study cobordism relations for Morse functions, as these are naturally based on smooth stable map germs into the plane. For example, Saeki and Yamamoto defined a notion of cusp cobordism for Morse functions on compact manifolds possibly with boundary, and used the combinatorics of Reeb graphs to compute the cusp cobordism group of Morse functions on surfaces. In this talk, which is based on our work [1], we determine the cusp cobordism group of Morse functions on manifolds of arbitrary dimension by employing Levine's cusp elimination technique as well as the complementary process of creating pairs of cusps along fold lines. For Morse functions on surfaces our result yields an explicit description of Saeki-Yamamoto's cobordism invariant which they first constructed by using the cohomology of the universal complex of singular fibers.

References

[1] **D.J. Wrazidlo**, *Cusp cobordism group of Morse functions*, accepted on May 24, 2021 for publication in: Journal of Topology and Analysis.
https://arxiv.org/abs/1905.05712