

## Weakly Semialgebraic Spaces

The book is the second part of an intended three-volume treatise on semialgebraic topology over an arbitrary real closed field  $R$ . In the first volume (LNM 1173) the category  $LSA(R)$  or regular paracompact locally semialgebraic spaces over  $R$  was studied. The category  $WSA(R)$  of weakly semialgebraic spaces over  $R$  - the focus of this new volume - contains  $LSA(R)$  as a full subcategory. The book provides ample evidence that  $WSA(R)$  is "the" right cadre to understand homotopy and homology of semialgebraic sets, while  $LSA(R)$  seems to be more natural and beautiful from a geometric angle. The semialgebraic sets appear in  $LSA(R)$  and  $WSA(R)$  as the full subcategory  $SA(R)$  of affine semialgebraic spaces. The theory is new although it borrows from algebraic topology. A highlight is the proof that every generalized topological (co)homology theory has a counterpart in  $WSA(R)$  with in some sense "the same", or even better, properties as the topological theory. Thus we may speak of ordinary (=singular) homology groups, orthogonal, unitary or symplectic  $K$ -groups, and various sorts of cobordism groups of a semialgebraic set over  $R$ . If  $R$  is not archimedean then it seems difficult to develop a satisfactory theory of these groups within the category of semialgebraic sets over  $R$ : with weakly semialgebraic spaces this becomes easy. It remains for us to interpret the elements of these groups in geometric terms: this is done here for ordinary (co)homology.

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