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Symmetric Squaring in Homology and Bordism

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Looking at the cartesian product X \times X of a topological space X with itself, a natural map to be considered on that object is the involution that interchanges the coordinates, i.e. that maps (x, y) to (y, x). The so-called 'symmetric squaring construction' in \v{C}ech homology with Z/2-coefficients was introduced by Schick et al. 2007 as a map from the k-th \v{C}ech homology group of a space X to the 2k-th \v{C}ech homology group of X \times X divided by the above mentioned involution. It turns out to be a crucial construction in the proof of a parametrised Borsuk-Ulam Theorem. The symmetric squaring construction can be generalized to give a map in bordism, which will be the main topic of this thesis. More precisely, it will be shown that there is a well-defined, natural map from the k-th singular bordism group of X to the 2k-th bordism group of X \times X divided by the involution as above. Moreover, this squaring really is a generalisation of the \v{C}ech homology case since it is compatible with the passage from bordism to homology via the fundamental class homomorphism. On the way to this result, the concept of \v{C}ech bordism is first defined as a combination of bordism and \v{C}ech homology and then compared to \v{C}ech homology.

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