Summary

This thesis is concerned with a study of singular points of *minimizing* harmonic and biharmonic maps.

In the first part we focus on harmonic maps. *Minimizing* harmonic maps with prescribed boundary conditions may have singularities. We focus on the model case of mappings from $\mathbb{B}^3$ to $\mathbb{S}^2$. For some boundary data it is known that all corresponding minimizers have singularities and the Dirichlet energy is strictly smaller than the infimum of the energy among the continuous extensions (the so called *Lavrentiev gap phenomenon* occurs). We prove that the Lavrentiev gap phenomenon for harmonic maps into spheres holds on a dense set in the set $\mathcal{S}$ of smooth boundary maps $\varphi\colon \mathbb{S}^2 \to \mathbb{S}^2$ endowed with the $W^{1,p}$-topology, where $1 \leq p < 2$. This result is sharp: it fails in the $W^{1,2}$-topology of $\mathcal{S}$.

In the second part we consider the case of *minimizing* biharmonic maps into compact manifolds. The first step in studying the singularities of such mappings is the question of regularity near the boundary. We obtain a conditional result — assuming a boundary monotonicity formula we prove that *minimizing* biharmonic maps are smooth in a full neighborhood of the boundary. We expect that the boundary monotonicity formula is satisfied by all minimizing biharmonic maps with sufficiently smooth boundary data.