This thesis proposes a new method for fairing of surfaces, which are represented by a triangulated mesh. Motivation for our task is a 3D reconstruction, which results in a triangulated mesh. Such mesh is typically corrupted by noise (due to data and processing inaccuracy), which is required to be faired out. We solve the problem on a discrete surface, where two criteria for optimization are defined: surface curvature and non-uniformity. The curvature deals with surface smoothness, while the non-uniformity with surface regularity. The problem of fairing is solved by a discrete diffusion. Since our aim is to fair surfaces with boundaries, first we describe the fairing of curves, then fairing of closed urfaces, and finally fairing of surfaces with boundary (which is in fact a combination of the former ones). We have tested the algorithm's performance on synthetic as well as real data with
good results. The experiments showed that our proposed algorithm is robust, stable and does not shrink an object, while its main surface characteristics are preserved.