

In this thesis, we concern ourselves with the linear approximation problem, where errors in both the observation and the data are considered. We focus on the *total least squares* problem (*TLS*), which may be used in solving such tasks. We summarise basic theory of the existence and uniqueness of the TLS solution, present the classic TLS algorithm and examine some possible complications, which may appear during its implementation. Furthermore, we shall study the *singular value decomposition* (*SVD*), which is used in constructing the TLS solution. As the SVD is rather difficult to compute, we discuss one of the possible methods of approximating only its part necessary for the construction of the TLS solution, the so called *singular triplets*. This method is based on *Golub-Kahan iterative bidiagonalization*. Finally, we shall test how the quality of the approximation of the smallest singular triplets influences the computed TLS solution.