

# On the Errors-In-Variables Model with singular covariance matrices

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## Abstract

Over the last few years, Total Least-Squares (TLS) estimation within Errors-In-Variables (EIV) Models has been extended not only to the case of element-wise weighted observations (corresponding to diagonal weight matrices), but also – and more importantly – to the case of arbitrary positive-definite weight matrices (defined as inverse covariance matrices), in which case “Mahboub’s algorithm” provides the Weighted TLS Solution after a few iterations. Yet, the case of an EIV-Model with singular covariance matrices has not been considered in much detail, although unique TLS solutions may exist that take the (uninvertible) covariance matrices into proper account. Here, a generalization of “Mahboub’s algorithm” will be developed for this purpose, followed by its application to a typical geodetic example (such as the 2-D Helmert transformation).

## Keywords

Errors-In-Variables (EIV) Models, Total Least-Squares (TLS), Singular covariance matrices, 2-D coordinate transformations.

## References

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