EGU2020-8188
https://doi.org/10.5194/egusphere-egu2020-8188
EGU General Assembly 2020


# New Total Least Squares Algorithm and Model with Applications to the Transformation among ITRF Realizations

**Jianqing Cai**[1], Dalu Dong[2], and Nico Sneeuw[1]
[1]University of Stuttgart, Geodetic Institute, Stuttgart, Germany (cai@gis.uni-stuttgart.de)
[2]Nanjing Institute of Surveying, Mapping & Geotechnical Investigation, Nanjing, China

A newly developed Converted Total Least Squares (CTLS) algorithm is introduced, which is to take the stochastic design matrix elements as virtual observations, and to transform the TLS problem into a traditional Least Squares problem. This new algorithm has the advantages that it can not only easily consider the weight of observations and the weight of stochastic design matrix, but also deal with TLS problem without complicated iteration processing, which enriches the TLS algorithm and solves the bottleneck restricting the application of TLS solutions. The notable development of the CTLS reveals also that CTLS estimator is identical to Gauss-Helmert model estimator in dealing with EIV model, especially in the case of similarity coordinate transformation. CTLS has been successfully applied to the estimation of the transformation parameters, their rates and related transformed residuals between actual ITRF realizations of ITRF2014 and ITRF2008 with obvious improvement of their accuracies.