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Sensitivity analysis in earth orientation SSA modeling

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It is well known that a wide class of complex signals as encountered in geodesy and geophysics, can be efficiently modeled by the use of Singular Spectrum Analysis (SSA) decomposition related to the signal variability as expressed in terms of its lag-covariance structure. Here we develop a sensitivity analysis that permits to appreciate and quantify the stability of the SSA component signatures,by using bootstrap analysis to learn how variable they are and to assess the statistical accuracy of the parameters of interest. The method is developed and tested on 2 Earth Orientation time series from space geodetic observational techniques.The first one is used to test the method in the context of high frequency SSA components. Secondly, nutation residuals are investigated over 20 years in order to track the Free Core Nutation (FCN) signature and other significant nonstationary components.The results are discussed from mathematical and geophysical viewpoints with emphasis on algorithmic aspects.