

A preliminary observation of 531-day period in wobble of the polar motion A preliminary observation of 531-day period in wobble of the polar motion

Hao Ding¹, Wen-Bin Shen^{1*}

Hao Ding¹, Wen-Bin Shen^{1*}

¹Wuhan University

¹Wuhan University

Previous studies show that the polar motion contains two dominant components, namely the annual wobble (AW) with a 12-month period and the Chandler wobble (CW) with a 14-month period. Some scholars consider that the frequency of the CW varies with its amplitude; some scholars consider that CW has double or multiple frequencies; some scholars consider that the frequency of CW is invariant. In 180s, a 530-day-period wobble in polar motion was marginally detected. Since then, we did not find literatures addressing this wobble period from any kind of observations. In this preliminary study, we apply the ensemble empirical mode decomposition (EEMD) method to analyses of two kinds of observations. First, applying EEMD to two polar motion time series, the EOP C04-05 series with one-day sampling interval spanning 1962 to 2012 and the POLE2010 series with one-month sampling interval spanning 1900 to 2011, we observed a 531-day-period (about 0.68683 cpy) wobble and a 530-day-period (0.68913) wobble, respectively. Noting that the estimated amplitudes and frequencies of this wobble from the two series are different from each other, we consider that the difference is caused by the relative poor quality of the POLE2010 series during 1900-1961. Deleting the poor quality data sets, we obtain the 531-day-period wobble from both time series. Our results show that the frequency modulation of the CW may greatly suppress the 531-day-period wobble so that it cannot be observed in conventional direct power spectra of the polar motion series. Second, applying EEMD to two superconducting gravimeter records with a length of about 15 years and one-day sampling interval, we also observed the 531-day-period wobble. If the 531-day-period wobble really exists, it might be caused by the fluctuations of global atmospheric and oceanic angular momentums. Further investigations are still in progress. This study is supported by NSFC (grant No. 41174011), National 973 Project China (grant No. 2013CB733305) and NSFC (grant No. 41210006, 41128003, 41021061, 40974015).

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