



Geopotential determination based on time and frequency comparisons using VLBI signals

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According to Einstein's general theory of relativity, a precise clock runs faster at a position with higher geopotential than a clock at a position with lower geopotential. Here, we provide a preliminary formulation to determine the geopotential difference by time and frequency comparisons between two VLBI stations based on the signal from a common quasar in space. For time comparison, the time difference between two time series from VLBI observations for a common time elapse needs to be determined. For frequency comparison, we need to determine gravitational frequency shift of VLBI signals due to geopotential difference. To valid the feasibility of the formulation, we completed simulative experiments to compute the geopotential difference between two VLBI stations using time and frequency comparisons based on simulation data. The results demonstrate that this formulation is potential and reliable. This study provides a way to determine the geopotential based on VLBI observations. This study is supported by NSFCs (grant Nos. 41631072, 41721003, 41429401, 41574007, 41874023, 41804012).