



Fringe signal processing in a compact absolute gravimeter with a 2 mm rise-and-fall trajectory

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Long-term monitoring of gravity variations in the volcanic areas requires a dense absolute gravity network supported by multiple robust and compact absolute gravimeters. The Earthquake Research Institute, the University of Tokyo, Japan, develops various geophysical instrumentation, including absolute gravimeters. Such instruments are based on the interferometric tracking of an object freely falling in the Earth gravity field. A prototype of a compact rise-and-fall absolute gravimeter TAG-2 tosses up an object using special piezo-actuators only up to 2-3 mm. This presentation reports on solved problems of fringe signal processing arising from the ultra-short drop, when the fringe frequency around an apex is relatively low. The free-fall trajectory is constructed using the homodyne quadrature laser interferometer complemented with a special apex step removal algorithm. Such an approach enables a conventional linear model suitable for the least-squares approximation on the equally spaced in time scale. The standard deviation of the mean of about 5000 drops is of order $10 \mu\text{Gal}$. Other details of the prototype's performance will be also reported.