Detection of anomalous crustal deformation mode in tectonic region

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Recent precise observations(GSI,2000) of secular changes in ellipsoidal and orthometic heights have revealed that these two secular changes do not coincide at all. In order to solve this problem, a new equation for studying the time variation in orthometric height,which provides unstable modes of crustal movement in a special case, is presented. By making some assumptions to solve this equation,strong instability and fluctuating modes were estimated to occur with periods of 46 and 16 years, respectively. The detection of these modes including gravity-induced decay instability including tectonomagnetic electrokinetic wave is pointed out to be very important.

Recent observations(GSI,2000) of secular changes in ellipsoidal and orthometric heights have discounted the approximation that both are equal, which has to date been confirmed from continuous GPS and leveling observations. The approximation was made on the assumption that the effect of the temporal change in geoidal height is usually very small. Contrary to this theoretical assumption, recent observations reveal that these two terms do not coincide at all.

In order to solve this problem, a new equation for tracing the time variation in orthometric height to unstable state, which provides unstable modes of crustal movement in a special case of parametric excitation type, is presented.

By making some assumptions to solve this equation, strong instability mode and fluctuating mode were estimated to occur with periods of 46 and 16 years in Tokai region. These show that periodic anomalous crustal deformation modes fluctuate with temporal changes in the geopotential surface.

This cyclic process is compared with the pattern of earthquake cycle presented by Scholz et al.(1973) and Fujita and Fujii(1973).

The detection of this gravity-induced bubble decay instability is very important for short period earthquake prediction, including the detection of gravity induced electrokinetic waves through tectonomagnetism.