



Using invariants of the gravitational gradient tensor as boundary values to solve for the gravitational field

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The study is motivated by GOCE mission and mainly deals with the invariants of the gravitational gradient tensor. At first, the invariants are introduced, linearization models are established starting from the invariants, and the models can be referred as the boundary values on the satellite's orbit. Secondly, the spherical approximations for the models are derived and they can be simply expressed as boundary values of the second derivative of the disturbing potential along radial direction. Then based on the spherical approximation, the effects of J_2 -term are considered so that the accuracies of the boundary values can efficiently be raised. And then errors about combinations of the invariants are estimated. And still then it is discussed how to compute the invariants from GOCE mission. At last, some arithmetic examples are constructed from EGM98 model and the results illustrate that the boundary values have enough accuracies to recover the gravitational field.

Keywords: The gravitational field, Gravitational gradiometry, Invariants of tensor