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Modeling the deficiency of the Euclidean coordinate norm on the Earth's surface and at higher altitudes for strongly varying gravity fields

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The gravity field effect with respect to Earth referenced coordinate systems has been a long term task to model in Geodesy. This task received higher importance during recent decades due to a relative abundance of gravity field direct and indirect data and in association to the use of hybrid measuring systems like INS (Inertial Navigation Systems). The paper is focussed on the variable metric space that Geodesy is subjected to due to the Earth's gravity field, which has been approximated in various modeling forms. The particular objective in the present work is to provide estimations of the expected variation of the Euclidean norm along and across plumb-line on the Earth's surface in strongly varying gravity fields and at altitudes for most frequent INS types.