



Between-satellite-track interpolation by biharmonic functions

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Dedicated gravity field missions as GRACE sample the gravitational field of the Earth only along the satellite ground-tracks. Usually, surface spherical harmonics are used to interpolate from the ground track to the whole surface of the Earth. Especially in a repeat-orbit situation, this spherical harmonics interpolation contributes significantly to the undesired striping effect.

The ground track of a repeat orbit forms a pattern with diamond-shaped cells. The gravitational field is only known at the boundaries of these cells. An interpolation from the boundary to the interior of the cells has to fulfill two requirements

1. reproduction of the values at the boundaries.
2. minimal "deformation energy" inside the cell.

The only function fulfilling this requirement is the solution of a boundary value problem for the biharmonic equation.

The poster will show the discretization of the biharmonic operator for a grid, which is parallel to the boundaries of the cell. It will solve the boundary value problem by the method of finite differences and will compare the solution with the usual surface spherical harmonics expansion.