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A first order solution to the ellipsoidal Stokes problem by geometrical perturbation

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The gravimetric determination of the geoid gives rise to a Robin boundary value problem for the Laplace equation in the exterior of the Earth reference ellipsoid . We get a first order solution to this ellipsoidal Stokes problem by perturbation theory. The perturbation is only geometric by introducing a one-parameter family of ellipsoids of revolution sharing the semi-minor axis equals to that of the reference ellipsoid and where the parameter is the square of the eccentricity. The given functions on the boundary condition are considered fixed functions of the geodetic latitude and longitude. We prove a uniqueness theorem for the boundary value problem that is obtained when the parameter is equal to zero. This problem is slightly different from the classical spherical Stokes problem.