On the numerical stability of coefficients for Associated Legendre Functions

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The high resolution computation of gravity field constituents in spherical harmonics has become a quasi standard e.g. for the reduction or comparison of topographic effects on satellite based gravity field models. Using a spectral approach for the computation of the basis functions has several advantages, such as direct access to derivatives of gravity functions and high efficiency through fast Fourier or Hankel transforms. In our presentation we focus on the numerical stability of the respective functions through finite sums from coefficients, applying either scaling or gaussian forward elimination and backward recursion.