Geoid determination using a combined FFT-Wavelet Solution

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A computational scheme using a combination of wavelet and FFT transforms has been developed for local geoid approximation. Wavelet multiresolution analysis, FFT, and the combined algorithm are introduced for the solution of the Stokes problem. The wavelet algorithm is built on using an orthogonal wavelet base function. Different thresholding and filtering techniques are used in the case of the wavelet only solution. Different mother wavelets are tested for both the wavelet only and the combined FFT-Wavelet solution. The combined scheme gives an indication as to the existence of a shift invariant wavelet solution. The theoretical proof and numerical results are given for the combined algorithm. The combined algorithm seeks to overcome the problem of FFT when dealing with non-stationary signal and kernel. The Stokes problem will be an example of this case study. The comparison between FFT, wavelet transform, and combined FFT and wavelet transform is done through the solution of both stationary and non-stationary cases. Conclusions and recommendations are given with respect to the suitability, accuracy and efficiency of this method.