Abstract:
The range of applications of Boundary Element Methods (BEM) is restricted to cases where the fundamental solution is known. An approach recently developed by the author via the Fourier transform generalizes the BEM to the so-called Fourier BEM (Fourier BEM—generalization of boundary element methods by Fourier Transform. Springer, Berlin Heidelberg New York, 2002). There, new boundary integral equations (BIE) are formulated, which consist only of Fourier transformed terms and lead to equivalent matrices as in the standard approach. They make use of only the Fourier transform of the fundamental solution, which is much easier to obtain (available for all cases as long as the differential operator is linear and has constant coefficients). No inverse transform and no fundamental solution in the original space are required. Here, the theory is summarized and an example of anisotropic elasticity is given to motivate the discussion of singularities, which is the topic of this paper. It is shown, that all types of singularities (weak, strong, and hyper) occur as in the standard approach and that they require a new treatment because they are originating from newly developed integral
The main result is that the non-regular parts of the strong and hyper singular integrals cancel if ordered correctly.

Stichworte: Boundary element methods – Fundamental solutions – Fourier transform – Singularities

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