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Solving Wiener-Hopf problems without kernel factorisation

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Abstract

We present a new approach for solving Wiener-Hopf problems by showing its implementation in two typical examples from fluid mechanics. The new method adapts various mathematical ideas underlying the so-called unified transform method due to A.S. Fokas and collaborators in recent years. The method has the key advantage of avoiding what is usually the most challenging part of the usual Wiener-Hopf approach: the factorisation of kernel functions into sectionally analytic functions. We show that the new approach leads naturally to fast and accurate schemes for evaluation of the solutions.

Key words: Fokas transform method, Wiener-Hopf, complex analysis