Finite-difference quadrature and inverse scattering

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Abstract

One of classical tasks of the network synthesis is to construct ROMs realized via ladder networks matching rational approximations of a targeted filter transfer function. The inverse scattering can be also viewed in the network synthesis framework. The key is continuum interpretation of the synthesized network in terms of the underlying medium properties, aka embedding. We describe such an embedding via finite-difference quadrature rules (FDQR), that can be viewed as extension of the concept of the Gaussian quadrature to finite-difference schemes. One of application of this approach is the solution of earlier intractable large scale inverse scattering problems. We also discuss an important open question in the FDQR related to Lothar's earlier contributions, in particular, a possibility of finite-difference Gauss-Kronrod rules.