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Multilevel approach for signal restoration problems with Toeplitz matrices.

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We present a multilevel method for discrete ill-posed problems arising from the discretization of Fredholm integral equations of the first kind. In this method we use the Haar wavelets as restriction and prolongation operators. The choice of the Haar wavelet operator has the advantage of preserving matrix structure, such as Toeplitz, between grids, which can be exploited to obtain faster solvers on each level. Finally, we present results that indicate the promise of this approach on restoration of signals with edges.