

## Robust Chebyshev FIR Equalization

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- [rob\\_equal\\_globecom.pdf](#)
- [Matlab files](#) (you need [CVX](#) to run these scripts)

In Chebyshev finite-impulse response (FIR) equalization, we design an FIR filter that minimizes the Chebyshev equalization error, *i.e.*, the maximum absolute deviation between the equalized and the desired frequency response functions, assuming the unequalized response function is known exactly. In robust Chebyshev FIR equalization, we take into account uncertainty in the unequalized response function, described as a set of possible values for the unequalized response at each frequency, by designing an FIR filter that minimizes worst-case Chebyshev equalization error over all possible unequalized response functions. When the uncertainty in unequalized response function is described by a complex uncertainty ellipsoid, at each frequency, we show that the robust Chebyshev FIR equalization design problem can be formulated as a semidefinite program (SDP), and therefore efficiently (and globally) solved. When the uncertainty is given by a complex disk, the design problem can be formulated as a second-order cone program (SOCP), which can be solved almost as fast as the nominal Chebyshev equalization problem (ignoring uncertainty). The robust equalizer design method is demonstrated with a numerical example.

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