

Interference Alignment on the Deterministic Channel and Application to Fully Connected AWGN Interference Networks

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Abstract—An interference alignment example is constructed for the deterministic channel model of the K user interference channel. The deterministic channel example is then translated into the Gaussian setting, creating the first known example of a fully connected Gaussian K user interference network with single antenna nodes, real, non-zero and constant channel coefficients, and no propagation delays where the degrees of freedom outerbound is achieved. An analogy is drawn between the propagation delay based interference alignment examples and the deterministic channel model which also allows similar constructions for the 2 user X channel as well.

It has been shown that a K user interference network has $K/2$ degrees of freedom. In other words, as the total transmit power of the network is increased (or equivalently, as the AWGN power at each receiver is decreased), every user in an interference network will be able to simultaneously achieve half of the capacity (bits/sec/Hz) that he could achieve in the absence of the interference from other users. Similarly, for $M \times N$ node X networks, i.e. networks of M transmitters and N receivers where an independent message needs to be communicated between each transmitter-receiver pair the