

The problem of stabilizing an unstable plant over a noisy communication link is an increasingly important one that arises in problems of distributed control and networked control systems. Although the work of Schulman and Sahai over the past two decades, and their development of the notions of "tree codes" and "anytime capacity", provides the theoretical framework for studying such problems, there has been scant practical progress in this area because explicit constructions of tree codes with efficient encoding and decoding did not exist. To stabilize an unstable plant driven by bounded noise over a noisy channel one needs real-time encoding and real-time decoding and a reliability which increases exponentially with delay, which is what tree codes guarantee. We prove the existence of linear tree codes with high probability and, for erasure channels, give an explicit construction with an expected encoding and decoding complexity that is constant per time instant. We demonstrate the efficacy of the method through simulations.