

In this paper, we propose a simple procedure to construct (decodable) good codes with any given alphabet (of moderate size) for any given (rational) code rate to achieve any given target error performance (of interest) over additive white Gaussian noise channels. We start with constructing codes over groups for any given code rates. This can be done in an extremely simple way if we ignore the error performance requirement for the time being. Actually, this can be satisfied by repetition (R) codes and uncoded (UN) transmission along with time-sharing technique. The resulting codes are simply referred to as RUN codes for convenience. The encoding/decoding algorithms for RUN codes are almost trivial. In addition, the performance can be easily analyzed. It is not difficult to imagine that the RUN code usually performs far away from the corresponding Shannon limit. Fortunately, the performance can be improved as required by spatially coupling the RUN codes via block Markov superposition transmission (BMST), resulting in the BMST-RUN codes. Simulation results show that the BMST-RUN codes perform well (within around 1 dB away from Shannon limits) for a wide range of code rates and outperform the BMST with bit-interleaved coded modulation scheme.