# 基于 MATLAB 的卷积编解码仿真

# 摘　要

科技的发展带动了社会的进步，因而我们的生活也变得更加美好了。毫无疑问，通信技术是其中的重中之重，它使世界的联系更加紧密，促进了人与人之间的交流。众所周知，信道编码技术为通信的可靠传输做出了巨大贡献，而卷积码凭借着其卓越的功能无疑是其中之一。它具备不俗的纠错和检错能力，而且还有着编译码器基本原理结构简单，具体实现也不困难的优势等。

在该论文中简明地对卷积码的由来和其编译码原理进行了介绍，并且通过 matlab 软件的 simulink 模块设计完成了对卷积码的编译码和在 AWGN（加性白高斯噪声信道）中的误比特率统计的模块仿真。在论文的前中部分，主要介绍了卷积码的编码和译码的工作原理与各种表示方法。在仿真部分，将(2, 1, 2)卷积码，进行 BPSK 基带调制后送入 AWGN 中传输，通过噪声干扰后在接收端对信号进行相应的解调和 Viterbi 译码，最后则通过绘制出信噪比与误比特率曲线来观察卷积码的系统性能。仿真结果是卷积码的误码率随着信噪比的增大而减小，随着约束长度的增加而减小。

**关键词：**卷积码；Viterbi；matlab

## Abstract

The development of science and technology has promoted the progress of society, so our life has become more beautiful. There is no doubt that communication technology is the most important among them. It has brought the world closer together and promoted the communication between people. It is well known that channel coding technology has made great contribution to the reliable transmission of communication, and convolutional code is undoubtedly one of them with its excellent functions. It has not only the ability of error correction and error detection, but also the advantages of simple structure and easy implementation.

In this paper, the origin of convolutional code and its encoding and decoding principle are briefly introduced, and the encoding and decoding of convolutional code and the bit error rate statistics in AWGN (additive white gaussian noise channel) are simulated by simulink module design of matlab software. In the first part of the paper, the principle of coding and decoding of convolutional code and various representation methods are introduced. In the simulation part, the convolutional code (2, 1, 2) is transferred into AWGN after BPSK baseband modulation. After noise interference, the signal is demodulated and decoded by Viterbi at the receiving end. Finally, the system performance of convolutional code is observed by drawing the SNR and bit error rate curve. The simulation results show that the bit error rate of convolution code decreases with the increase of SNR and the increase of constraint length.



**Key words**: convolution code; Viterbi; matlab