

Cytosine methylation in CpG dinucleotides plays an important role in regulation of gene expression and cell differentiation. The structure of DNA double-helix is only weakly affected by cytosine methylation in CpG containing oligonucleotides, but a significant change of the duplex stability is caused. In this thesis, the melting properties of two self-complementary oligonucleotides CAAC GTTG and CAAm5C GTTG are studied using nuclear magnetic resonance spectroscopy. We measured  $^1\text{H}$  spectra at temperature range (276-350)K. The equilibrium and kinetic parameters of chemical exchange between duplexes and single strands were obtained by fitting the spectral lineshapes. Methylation of cytosine in the central CpG dinucleotide increases the melting temperature of each base pair. Thus, a high degree of cooperativity during chemical exchange is observed in our samples.