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The effect of sequence correlation on bubble conformation in double-stranded DNA JAE-HYUNG JEON, Department of Physics, Pohang University of Science and Technology, Pohang, 790-784, Korea, PYEONGJUN PARK, Division of General Education, Chungju National University, Chungju, Korea, WOKYUNG SUNG, Department of Physics, Pohang University of Science and Technology, Pohang, 790-784, Korea — Although DNA exists in its duplex structure stably at physiological temperature, it has been experimentally observed that DNA duplex locally denatures, allowing bubble conformation along the strand due to thermal fluctuation. Here we present a new stochastic formulation, using the Fokker-Planck and the equivalent Langevin equation for base pair distance of DNA, which are transformed from the Edwards equation that describes the base pair distance distribution with base pair index regarded as time. By simulating the Langevin equation, with a DNA sequence modelled by dichotomic random noise whose correlation decays exponentially, we study the effect of sequence correlation on the bubble size distribution for various sequence correlation lengths. For average bubble size, we obtain an exact analytical expression via the Fokker-Planck equation and discuss it in comparison with the simulation results.

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