Unzipping DNA from the condensed globule state–effects of unraveling[1] PUI-MAN LAM, Physics Department, Southern University, Baton Rouge — We study theoretically the unzipping of a double stranded DNA from a condensed globule state by an external force. At constant force, we find that the double stranded DNA unzips an at critical force F_c and the number of unzipped monomers M goes as $M \sim (F_c\text{-}F)^{-3}$, for both the homogeneous and heterogeneous double stranded DNA sequence. This is different from the case of unzipping from an extended coil state in which the number of unzipped monomers M goes as $M \sim (F_c\text{-}F)^{\chi}$, where the exponent χ is either 1 or 2 depending on whether the double stranded DNA sequence is homogeneous or heterogeneous respectively. In the case of unzipping at constant extension, we find that for a double stranded DNA with a very large number N of base pairs, the force remains almost constant as a function of the extension, before the unraveling transition, at which the force drops abruptly to zero. Right at the unraveling transition, the number of base pairs remaining in the condensed globule state is still very large and goes as $N^{3/4}$, in agreement with theoretical predictions of the unraveling transition of polymers stretched by an external force.

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