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Asymmetric and speed-dependent contact angle hysteresis and relaxation of a suddenly stopped moving contact line[1] DONGSHI GUAN, YONG JIAN WANG, Hong Kong University of Science and Technology, ELISABETH CHARLAIX, Université Grenoble Alpes , PENGER TONG, Hong Kong University of Science and Technology — We report direct atomic-force-microscope measurements of capillary force hysteresis and relaxation of a circular moving contact line (CL) formed on a long micron-sized hydrophobic fiber intersecting a water-air interface. The measured capillary force hysteresis and CL relaxation show a strong asymmetric speed dependence in the advancing and receding directions. A unified model based on force-assisted barrier-crossing is utilized to find the underlying energy barrier Eb and size λ associated with the defects on the fiber surface. The experiment demonstrates that the pinning (relaxation) and depinning dynamics of the CL can be described by a common microscopic frame-work, and the advancing and receding CLs are influenced by two different sets of relatively wetting and non-wetting defects on the fiber surface.

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