Abstract Submitted
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Optimised hyperbolic microchannels for the mechanical characterisation of bio-particles[1] OLIVIA DU ROURE, PMMH ESPCI Paris, YANAN LIU, Northwest University, Xian, China and PMMH ESPCI Paris, KONSTANTINOS ZOGRAFOS, University of Liverpool, UK, JOANA FIDALGO, University of Strathclyde, UK, CHARLES DUCHENE, CLMENT QUINTARD, THIERRY DARNIGE, PMMH ESPCI Paris, VASCO FILIPE, SYLVAIN HUILLE, Sanofi Biopharmaceutics, France, MONICA OLIVEIRA, University of Strathclyde, UK, ANKE LINDNER, PMMH ESPCI Paris — The transport of bio-particles in viscous flows exhibits complex dynamics such as reorientation, deformation and morphological transitions. Characterizing such behavior under controlled flows is key to understanding the mechanics of biological particles and the rheological properties of their suspensions. Here, we propose an innovative approach coupling numerically optimized design of microfluidic converging-diverging channels with a microscope-based tracking method to characterize the individual dynamics of bio-particles under homogeneous straining flow with high-quality images. We demonstrate experimentally the ability of the optimized microchannels to provide linear velocity streamwise gradients along the centerline, allowing for extended consecutive regions of homogeneous elongation and compression. We selected three test cases - DNA, actin filaments and protein aggregates - to highlight the ability of our approach for investigating the dynamics of objects from the biological world with a wide range of sizes, characteristics and behaviors.

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