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Origination of turbulence in dense suspensions of sperm cells PETR DENISSENKO, Warwick University, JACKSON KIRKMAN-BROWN, DAVID SMITH, Birmingham University, VASILY KANTSLER, Warwick University — Motile micro-organisms with pushing flagella, such as sperm cells, can be directed by "one way" microchannels with ratchet teeth-like wall configuration. We use an array of such micro-channels to gradually concentrate human spermatozoa in a circular arena of 1 mm diameter and 200 micron depth. Velocities of individual cells are measured by particle tracking and velocity of cell-carrying fluid is measured using PIV. At high concentrations, fluid velocities and the velocity fluctuations of individual cells exceeding that of individual swimmers in the dilute regime by an order of magnitude have been measured. Velocity correlations are calculated to study evolution of characteristic length scales as the cell concentration increases. Results are discussed in the context of self-organisation phenomena in active fluids and cooperation of sperm cells.

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