Bacteria dispersion in microchanel containing random obstacles

ADAMA CREPPY, HAROLD AURADOU, FAST, Universite Paris-Sud, CARINE
DOUARCHE, LPS, Universite Paris-Sud, VERONICA D’ANGELO, FIUBA, Ar-
gentina, JACKY NGUYEN, FAST, Universite Paris-Sud, FLUIDE AUTOMA-
tique ET SYSTEMES THERMIQUES COLLABORATION, LABORATOIRE
DE PHYSIQUE DU SOLIDE COLLABORATION, GROUPO DE MEDIOS
POROSOS, FIUBA COLLABORATION — Dispersion of particles in porous me-
dia is a classical problem well studied where physical laws are well established and
show good agreement with experimental observations. Recently, contrary to what is
thought, observations revealed that self-propelled particles under flow, orient their
swimming, what is designated by the term of rheotaxis. But less is known about
what happen for self-propelled particles under flow in presence of obstacles. For this
purpose, we developed a specific experimental setup in order to show the coupling
of bacteria E. Coli RP437 strain swimming with the presence of obstacles in the
dispersion process. We chose to develop a micro-fluidic device of rectangular section
of 0.05 $\mu m^2$ containing obstacles of different sizes (10 – 150 $\mu m$) when a bacteria
size is about 1 $\mu m$. Thanks to the transparency of the flow we can track hundreds
of trajectories of bacteria, the analysis of which revealed that their swimming influ-
ences the dispersion when the flow velocity is of the order of their swimming velocity
(10 $\mu m/s$).

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Adama CREPPY
FAST, Universite Paris-Sud