Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Self-Propulsion Of Catalytic Conical Micro-Swimmer[1] GIACOMO GALLINO, FRANCOIS GALLAIRE, Laboratory of Fluid Mechanics and Instabilities, Ecole Polytechnique Federale de Lausanne, ERIC LAUGA, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, SEBASTIEN MICHELIN, LadHyX, Ecole Polytechnique — Self-propelled artificial micro-motors have attracted much attention both as fundamental examples of active matter and for their potential biomedical applications (e.g. drug delivery, cell sorting). A popular design exploits the catalytic decomposition of a fuel (e.g. hydrogen peroxide) on the active surface of the motor to produce oxygen bubbles that propel the swimmer, effectively converting chemical energy into swimming motion. We focus here on a conical shape swimmer with chemically-active inner surfaces. Using numerical simulations of the chemical problem and viscous hydrodynamics, we analyze the formation, growth and motion of the bubbles inside the micro-motor and the resulting swimming motion. Our results shed light on the fundamental hydrodynamics of the propulsion of conical swimmers and may help to improve the efficiency of these machines.

[1]G.G. aknowledges support from the Swiss National Science Fundation

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Date submitted: 31 Jul 2017 Electronic form version 1.4