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A proprioceptive robotic swimmer. MEDERIC ARGENTINA, JESUS SANCHEZ RORIDGUEZ, CHRISTOPHE RAUFASTE, Universite Cote d'Azur, Nice France — In the context of fish locomotion, Lighthill proposed in 1971 his elongated body theory to predict the swimming gait [1]. Since his seminal article, the swimming velocity has been related to the fin kinematics (tail-beat amplitude and frequency) through the Strouhal number [2], which is found to be constant over 6 decades of Reynolds number for natural swimmers [3]. This result can be accounted for by a simple force balance, but the selection mechanism of the fin kinematics is still poorly understood. Here, we propose that the swimming locomotion might be driven by a proprioceptive feedback, which determines the tail-beat amplitude and frequency. A robotic fish has been built to test this mechanism and we will present our last results.

[1]Lighthill M. J. Large-amplitude elongated-body theory of fish locomotion 179 Proc. R. Soc. Lond. B, 1971

[2] Triantafyllou, M. S., G. S. Triantafyllou, and R. Gopalkrishnan. "Wake mechanics for thrust generation in oscillating foils." Physics of Fluids A: Fluid Dynamics 3, no. 12 (1991): 2835-2837.

[3]Gazzola, M., Argentina, M. and Mahadevan., L .Scaling macroscopic aquatic locomotion." Nature Physics 10.10 (2014): 758.

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