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The Influence of Drag on the Relation Between Swimming Number and Swimming Speed. DAVID GROSS, Institut Non Linaire de Nice/K-Epsilon, MEDERIC ARGENTINA, Institut Non Linaire de Nice, YANN ROUX, K-Epsilon SARL — The choice of gait parameters used by swimmers has been the subject of considerable research. The recent work of Gazzola et al. (2014) showed that swimmers follow a relation between the viscosity, the input parameters of length, tailbeat frequency and amplitude by way of a new non-dimensional swimming number Sw and the resulting Reynolds number Re that they swim at. The momentum balance leads to a 4/3 power relation between Sw and Re at moderately high Reynolds number and a linear relation between Sw and Re in the turbulent regime. We performed numerical simulations of a swimmer submitted to an imposed deformation and a resolved rigid body motion. A 2D unsteady, inviscid vortex panel method with vortex particle wake approach is used to represent the swimmer and its wake. The method was validated against the analytic solution of an impulsively started foil and a purely heaving foil. The vortex panel method is inviscid by its nature, but with an added viscous drag equivalent to a flat plate yields excellent agreement with the scaling laws observed by Gazzola et al. and 2D URANS results in both flow regimes The influence of Re dependent and independent drag coefficients was studied along with the limit of zero added drag.

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