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Scaling the Thrust Production and Energetics of Inviscid Intermittent Swimming EMRE AKOZ, KEITH MOORED, Lehigh Univ — Many fish have adopted an intermittent swimming gait sometimes referred as a burst-and-coast behavior. By using this gait, fish have been estimated at reducing their energetic cost of swimming by about 50%. Lighthill proposed that the skin friction drag of an undulating body can be around 400% greater than a rigidly-held coasting body, which may explain the energetic savings of intermittent swimming. Recent studies have confirmed the increase in skin friction drag over an undulating body, however, the increase is on the order of 20-70%. This more modest gain in skin friction drag is not sufficient to lead to the observed energy savings. Motivated by these observations, we investigate the inviscid mechanisms behind intermittent swimming for parameters typical of biology. We see that there is an energy savings at a fixed swimming speed for intermittent swimming as compared to continuous swimming. Then we consider three questions: What is the nature of the inviscid mechanism that leads to the observed energy savings, how do the forces and energetics of intermittent swimming scale with the swimming parameters, and what are the limitations to the benefit?[1]

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