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Role of Strouhal number (St) in free swimming[1] MEHDI SAADAT, HOSSEIN HAJ-HARIRI, University of Virginia — St of 0.2-0.4 has become synonymous with efficient self propulsion. Is it the cause, or an effect? As has been argued by a number of authors, St alone is insufficient to decide optimal motion because many inefficient combinations of amplitude and frequency lead to the same St. In this talk we show a simple ramification of free swimming where the swim speed and St are outputs. The iso-lines for speed, St, and thrust coincide so long as there is no massive leading-edge separation. It appears that St is simply related to how the drag coefficient and geometry of the body relates to the thrust coefficient and geometry of the propulsor. For a given combination of propulsor and body, St of motion is essentially independent of amplitude, frequency, and speed, and is only a function of shape. Some motions are efficient, and some are not. But they all have the same St.

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