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Adjoint-based optimization of fish swimming gaits[1] DANIEL FLORYAN, CLARENCE W. ROWLEY, Princeton University, ALEXANDER J. SMITS, Princeton University and Monash University — We study a simplified model of fish swimming, namely a flat plate periodically pitching about its leading edge. Using gradient-based optimization, we seek periodic gaits that are optimal in regards to a particular objective (e.g. maximal thrust). The two-dimensional immersed boundary projection method is used to investigate the flow states, and its adjoint formulation is used to efficiently calculate the gradient of the objective function needed for optimization. The adjoint method also provides sensitivity information, which may be used to elucidate the physics responsible for optimality.

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