Efficient optimization of swimming gaits[1] DANIEL FLORYAN, XU-ANHONG AN, CLARENCE W. ROWLEY, Princeton University — We study a simplified model of fish swimming—namely a rigid foil undergoing periodic motion—seeking motions that are optimal in regards to a particular objective (e.g. maximal thrust production). We use an immersed boundary method, and develop an adjoint formulation that allows us to efficiently calculate the gradient of the objective function that is used with gradient-based optimization. Moreover, the adjoint field provides sensitivity information which can be used to elucidate the physics responsible for optimality.

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