

Abstract Submitted
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Fish schooling as a basis for wind farm design¹ ROBERT WHITTLESEY, JOHN DABIRI, California Institute of Technology — It is known that horizontal axis wind turbines (HAWT) suffer from reduced aerodynamic efficiency when in close proximity to neighboring turbines. In contrast, recent work has shown that closely spaced vertical axis wind turbines (VAWT) may benefit from enhanced performance, reducing the associated land use for VAWT wind farm installations. A potential flow model of VAWT interactions is developed to determine configurations that optimize the power output of the array. A geometric arrangement based on fish schooling has been shown to significantly increase the array performance as measured by an Array Power Coefficient, which compares the average performance of turbines in the array to an isolated turbine. The results suggest that significant gains may be obtained through careful arrangement of VAWTs, showing up to a two order of magnitude decrease in land use (equivalently, a two order of magnitude increase in power density) compared to HAWTs.

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