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Performance and cavitation characteristics of bi-directional hydrofoils IVAYLO NEDYALKOV, MARTIN WOSNIK, Center for Ocean Renewable Energy, University of New Hampshire — Tidal turbines extract energy from flows which reverse direction. One way to address this bi-directionality in horizontal axis turbines that avoid the use of complex and maintenance-intensive yaw or blade pitch mechanisms, is to design bi-directional blades which perform (equally) well in either flow direction. A large number of proposed hydrofoil designs were investigated using numerical simulations. Selected candidate foils were also tested (at various speeds and angles of attack) in the High-Speed Cavitation Tunnel (HiCaT) at the University of New Hampshire. Lift and drag were measured using a force balance, and cavitation inception and desinence were recorded. Experimental and numerical results were compared, and the foils were compared to each other and to reference foils. Bi-directional hydrofoils may provide a feasible solution to the problem of reversing flow direction, when their performance and cavitation characteristics are comparable to those for unidirectional foils, and the penalty in decreased energy production is outweighed by the cost reduction due to lower complexity and respectively lower installation and maintenance costs.

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