Theory of pressure envelopes for hydrofoils

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Abstract

For two-dimensional potential flows, a theory of pressure envelopes for hydrofoils is developed. The theory predicts whether or not an arbitrary given function can be realized as the pressure envelope for a certain closed profile. Exact lower bounds of the pressure envelopes for symmetrical hydrofoils are derived and a new analytical method of hydrofoil design is developed. The method produces a profile shape with exactly the specified pressure envelope.