Rationalizing the bumps on whale flippers using basic aerodynamic theory ERNST VAN NIEROP, SILAS ALBEN, MICHAEL BRENNER, Harvard University, Division of Engineering and Applied Sciences — Recent experiments and numerics demonstrated that bumps on the leading edge of humpback whale flippers can lead to an increase in the lift/drag ratio and an increase in the stall angle, as compared to smooth flippers. Using basic aerodynamic theory (potential flow around a Joukowski profile, combined with lifting-line theory) we attempt to rationalize the experimental and numerical findings. We use this basic theory to find perturbations which could lead to an increase in stall angle.

Ernst van Nierop
Harvard University, Division of Engineering and Applied Sciences

Date submitted: 03 Aug 2006   Electronic form version 1.4