

Learning from the dolphin skin Analysis of the relation between skin morphology and local flow conditions for a fast-swimming dolphin

Projectdata

Project leader:	Prof. Dr. Ursula Siebert
Scientist:	Vadim Pavlov, PHD
Sponsoring:	Deutsche Forschungsgemeinschaft, Bonn

Project description

Study of the potential drag-reducing properties of dolphin skin. Morphological features of skin relevant to the reduction of friction drag were studied in the context of hydrodynamic performance of dolphin. For that purpose computer-aided design models of fast (common dolphin) and slow (harbor porpoise) species were constructed. Flow parameters were calculated for the typical swimming speeds and compared with local skin morphology data. It was shown that dolphin skin structure is similar to the anisotropic compliant walls and has a potential in friction drag reduction. Passive flow stabilization mechanism appears more effective in fast-swimming species.



Figure 1. CAD model presenting authentic geometry of the harbor porpoise *Phocoena phocoena*.

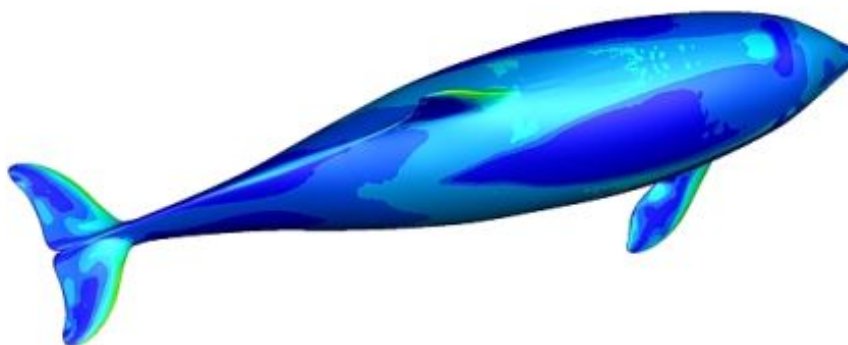


Figure 2. Distribution of the friction coefficient on the harbor porpoise model at slow speed of swimming, V. Pavlov, D. Riedeberger.

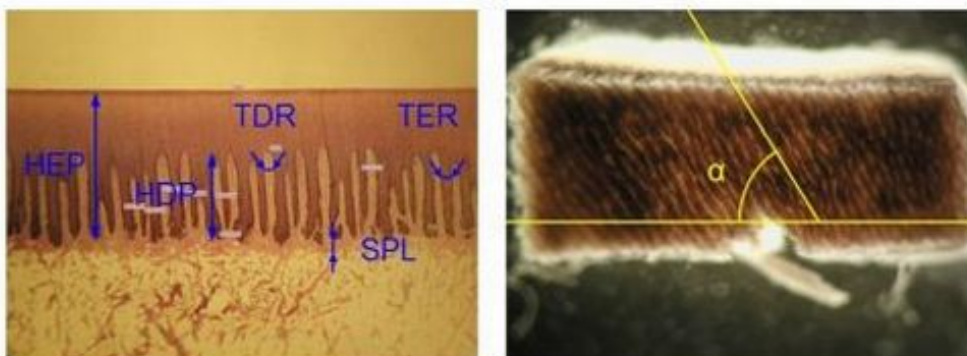


Figure 3. Skin morphology of the common dolphin. Basic measurements of the skin features.

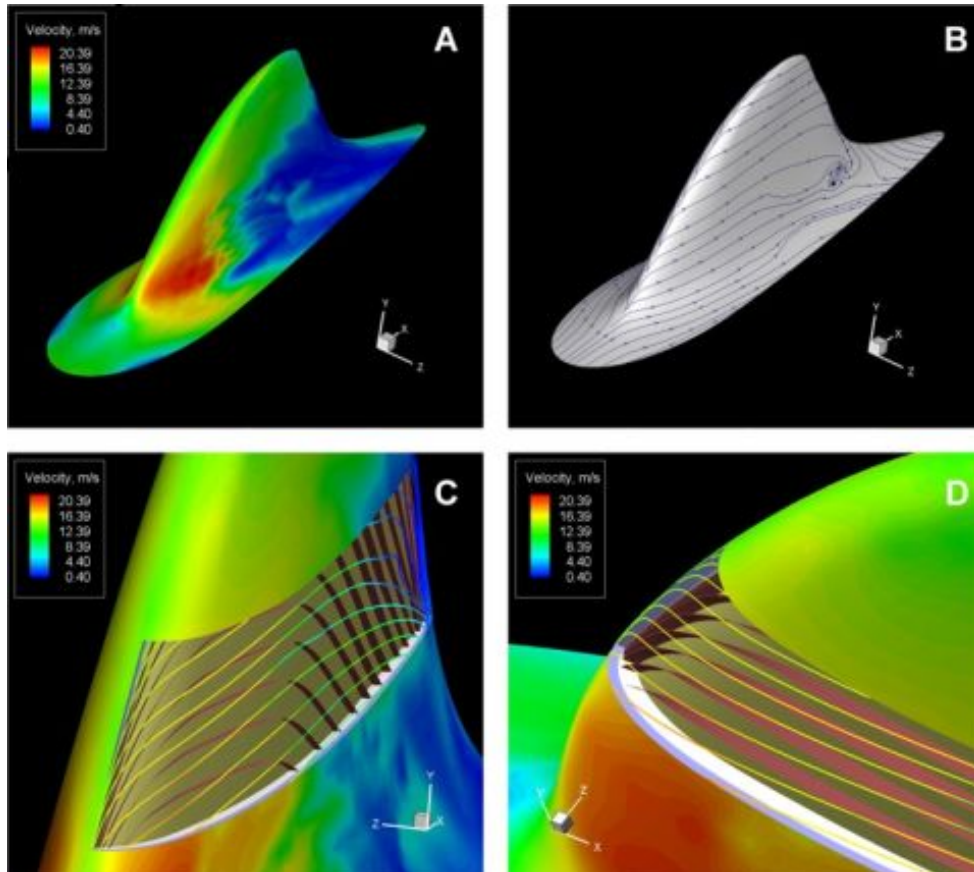


Figure 4. Skin morphology and hydrodynamics of the harbor porpoise dorsal fin.

[Contact person](#)

Stiftung Tierärztliche Hochschule Hannover
Institute for Terrestrial and Aquatic Wildlife Research
Wertstr. 6
25761 Büsum
Prof. Prof. h. c. Dr. Ursula Siebert
[send email](#)

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