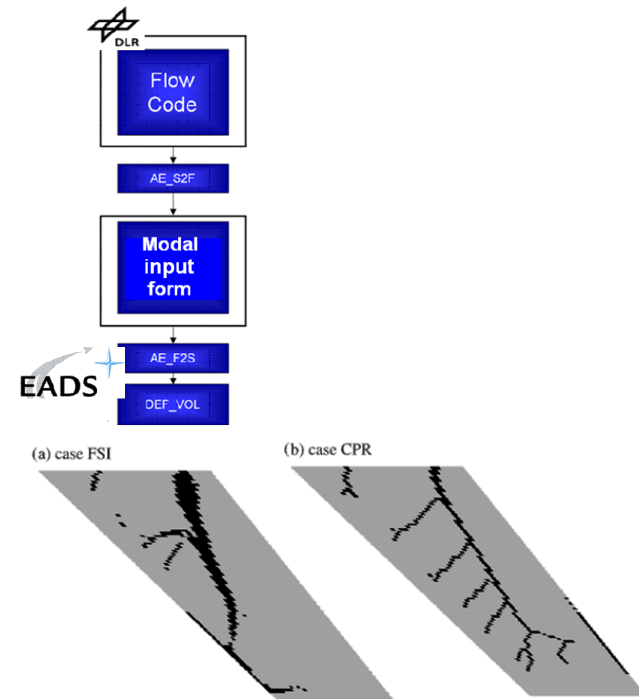
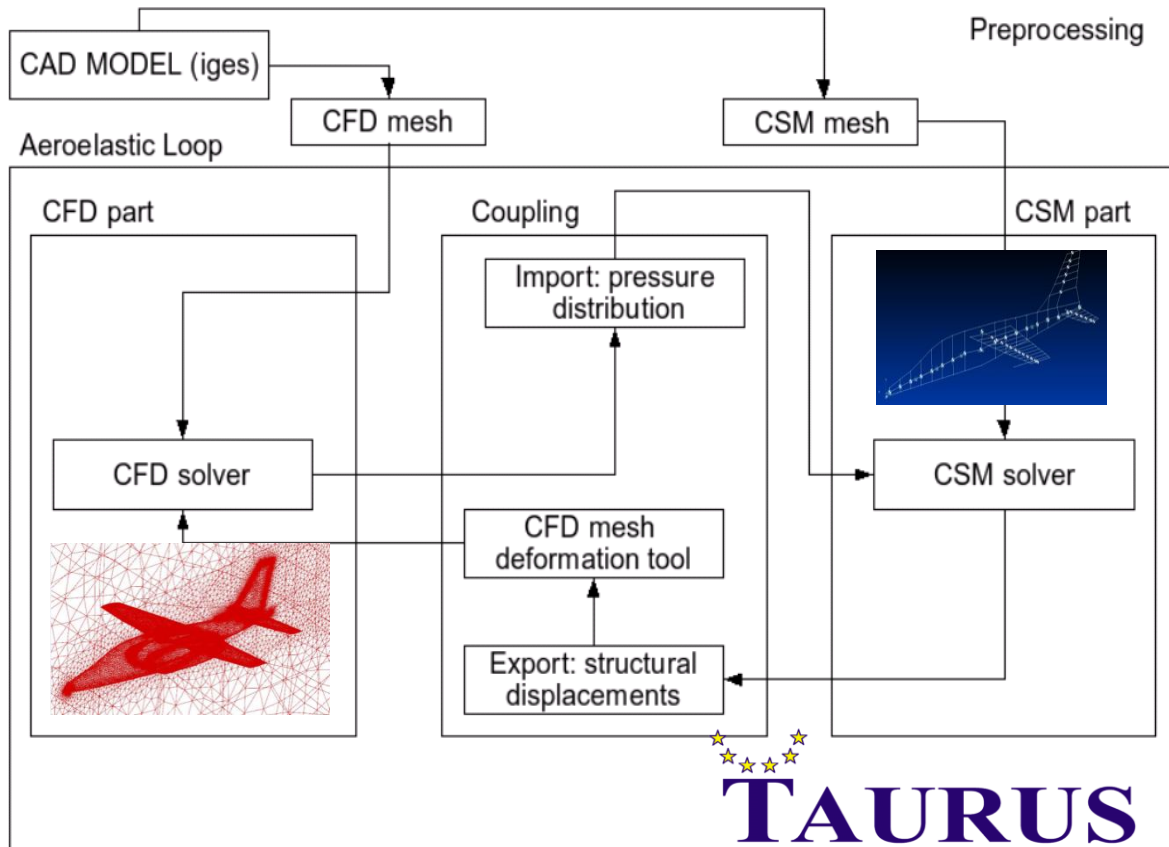


Biomimetic optimisation – new approach to aircraft structural design

Practical Example

Coupling the Optimization Procedure with Aeroelastic Numerical Environment

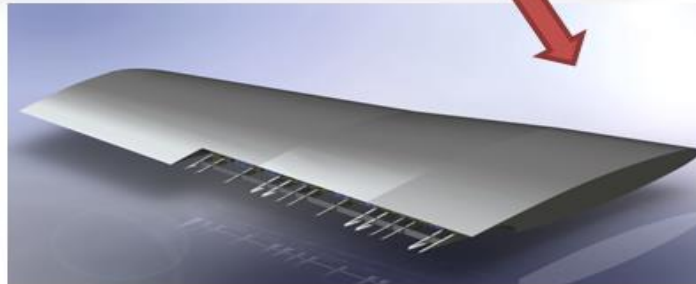
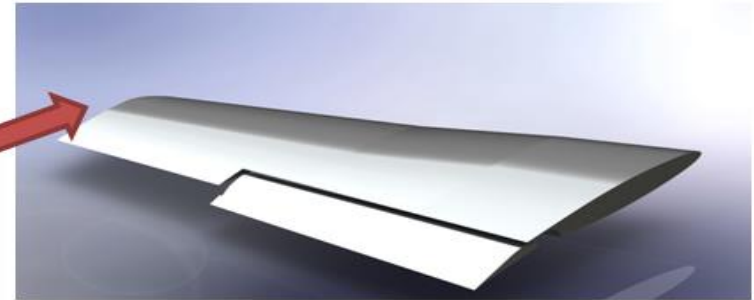


K. Maute and M. Allen, Struct Multidisc Optim 27, 27-42 (2004)

Practical Example

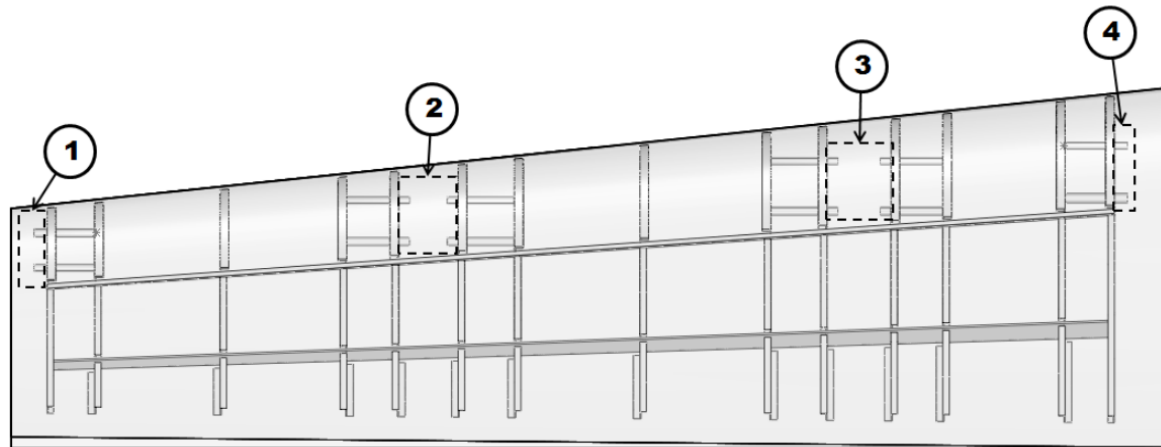
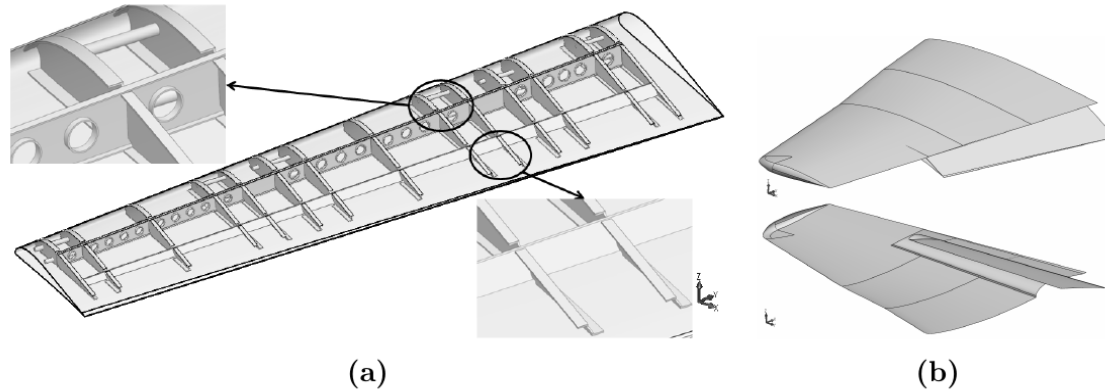
Coupling the Optimization Procedure with Aeroelastic Numerical Environment

I22 IRYDA - Wing and Fowler flap



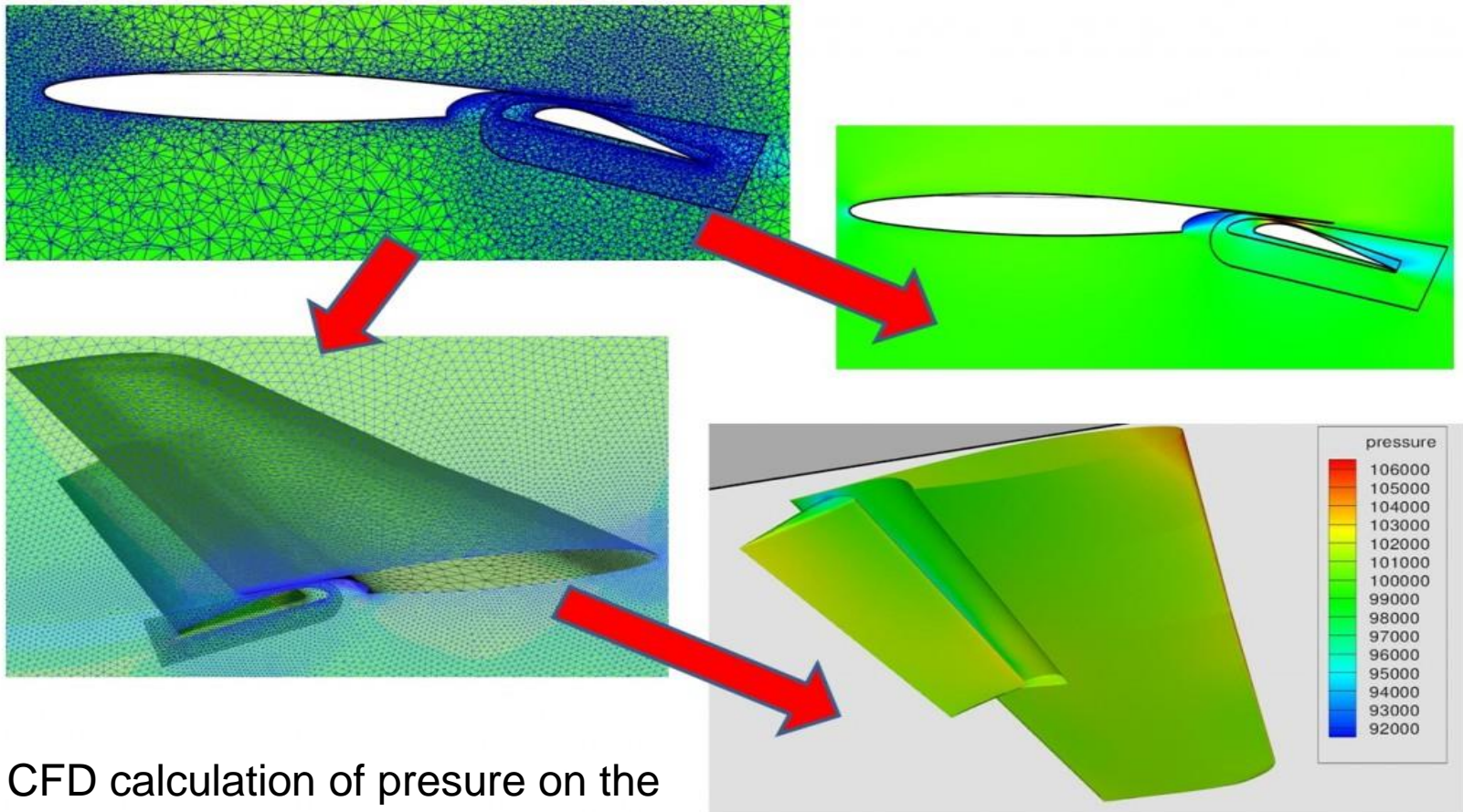
Practical Example

Coupling the Optimization Procedure with Aeroelastic Numerical Environment



Practical Example

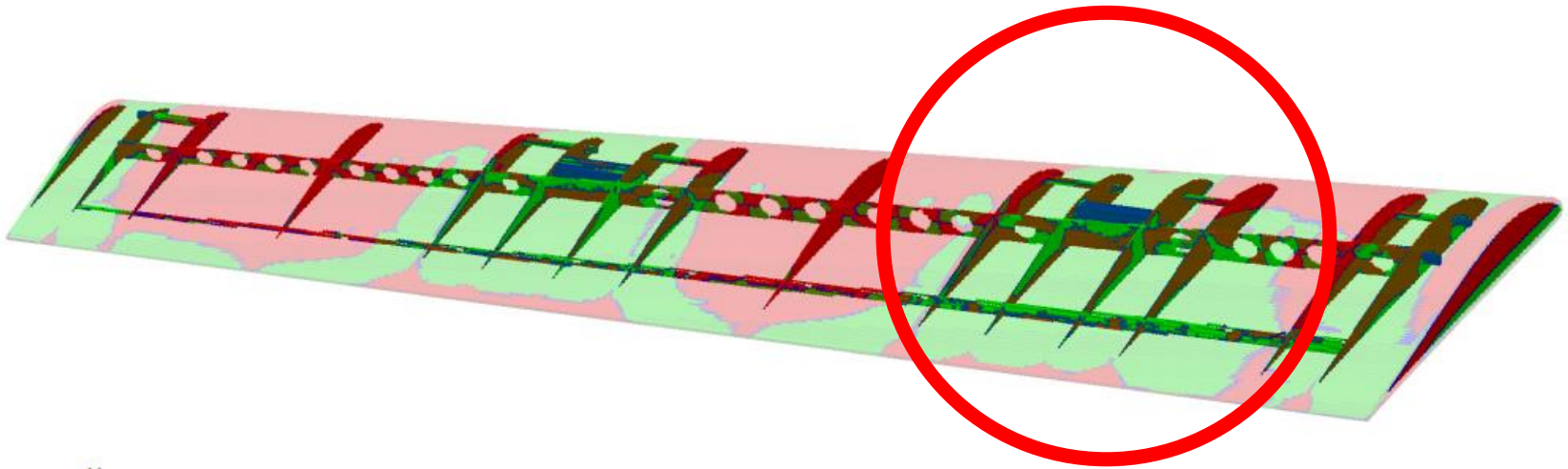
Coupling the Optimization Procedure with Aeroelastic Numerical Environment



CFD calculation of pressure on the wing and Fowler flap

Practical Example

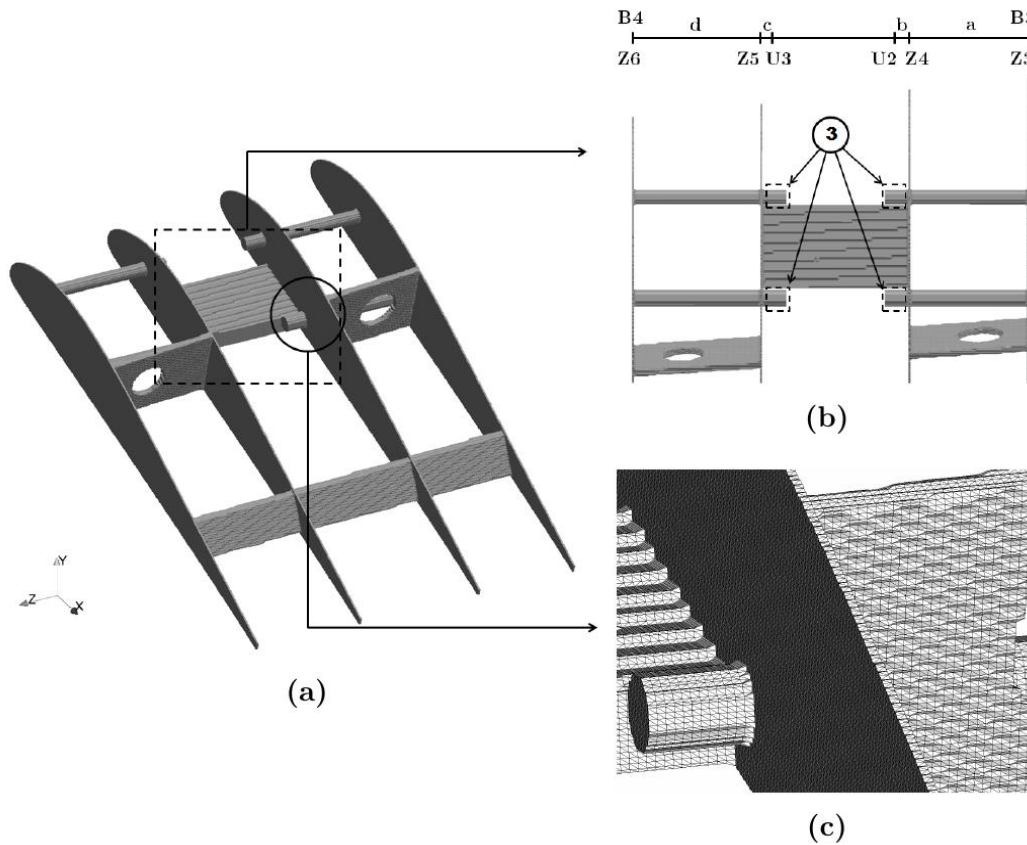
Coupling the Optimization Procedure with Aeroelastic Numerical Environment



Color map presents amount of energy on each part on
Fowler flap.

Practical Example

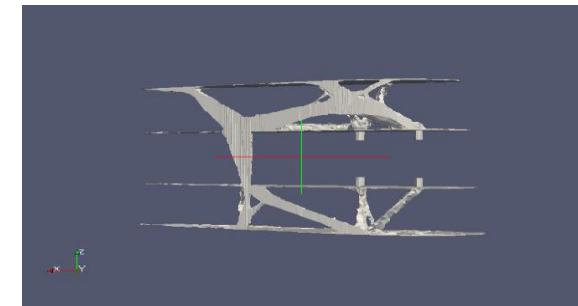
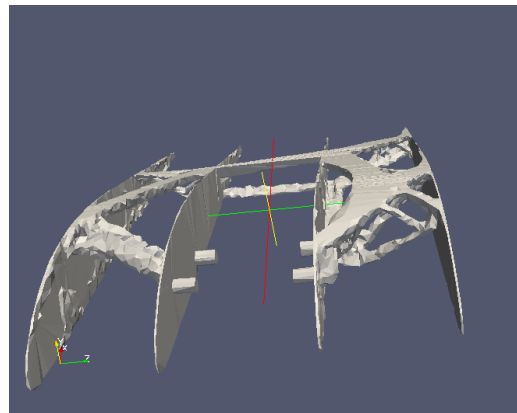
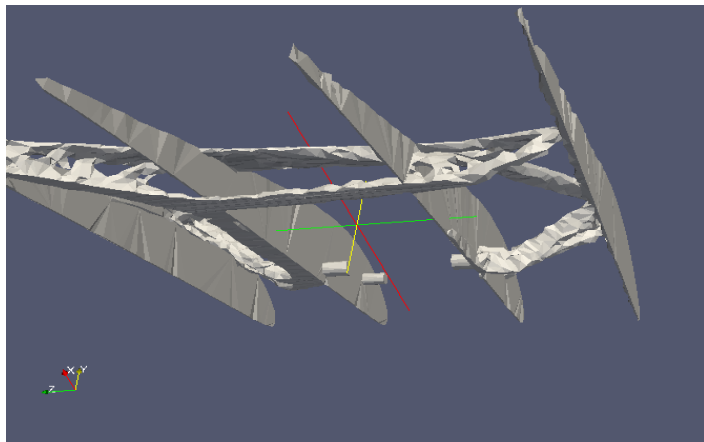
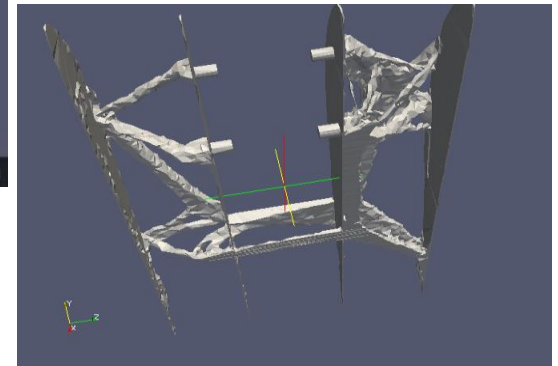
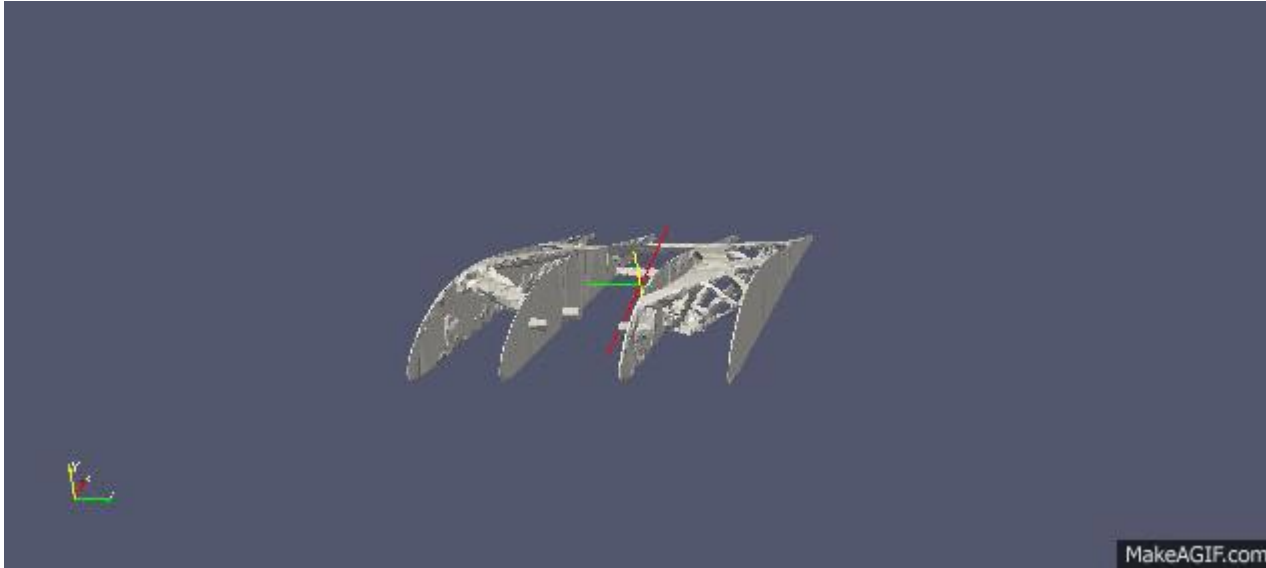
Coupling the Optimization Procedure with Aeroelastic Numerical Environment



Practical Example

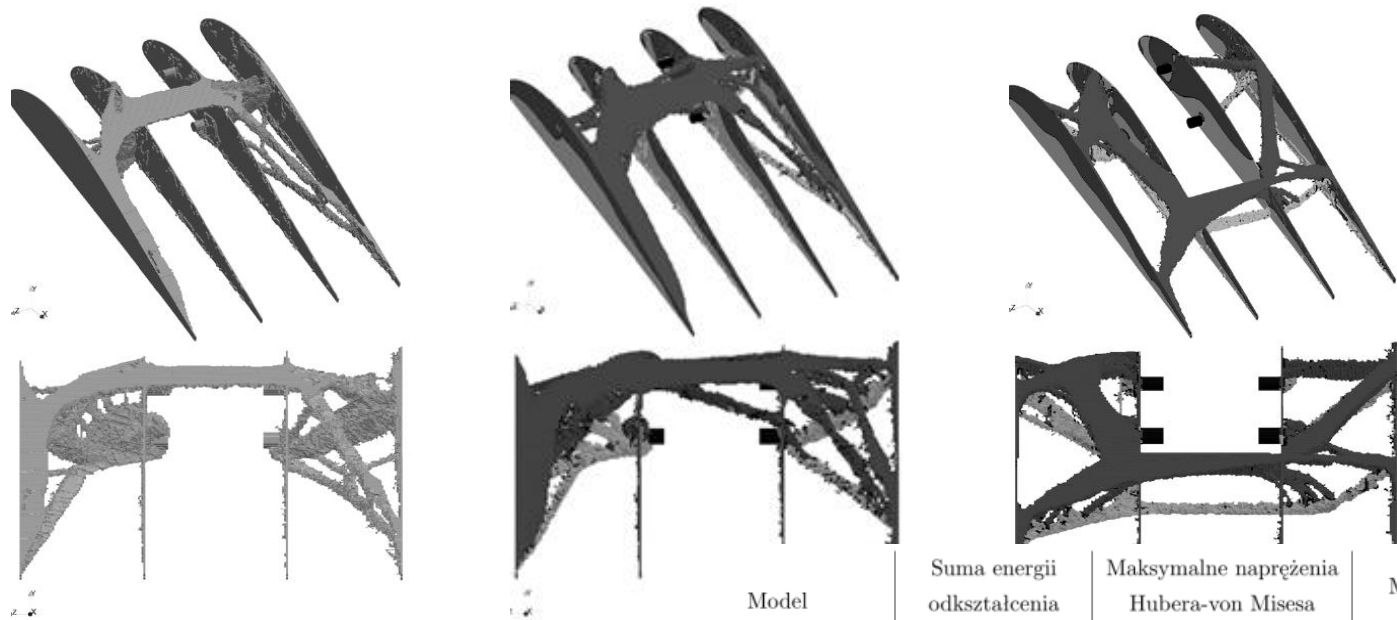
Coupling the Optimization Procedure with Aeroelastic Numerical Environment

Results of
Biomimetic Structural
Optimization
Implemented to the
Aeroelastic
Environment



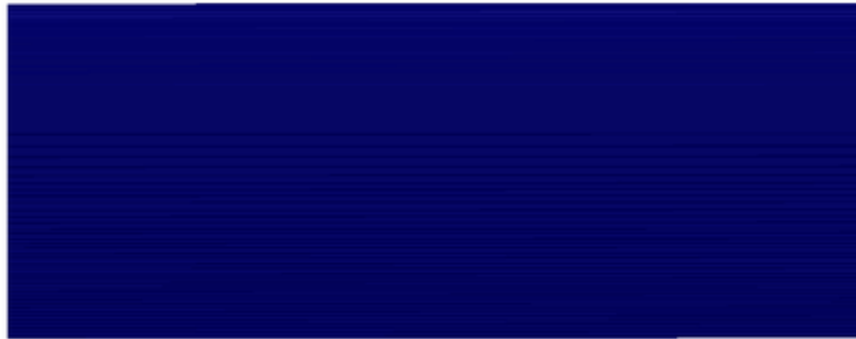
Practical Example

Coupling the Optimization Procedure with Aeroelastic Numerical Environment



Model	Suma energii odkształcenia		Maksymalne naprężenia Hubera-von Misesa		Masa	
	$[J/m^3]$	Δ	$[Pa]$	Δ	$[kg]$	Δ
referencyjny	1,26E+13		4,30E+08		2,57	
1 materiał	5,43E+12	-57%	8,15E+07	-81%	2,58	0%
2 materiały	5,71E+12	-55%	7,02E+07	-84%	2,64	3%
+ ograniczenie konst.	6,34E+12	-50%	1,78E+08	-59%	2,66	3%

Practical Example
Coupling the Optimization Procedure
with Aeroelastic Numerical Environment



Practical Example

Coupling the Optimization Procedure with Aeroelastic Numerical Environment





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Cosmoprojector

Biomimetic Topology Optimization Method