

Aerodinâmica Computacional

Aeroacústica

Propulsão

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A indústria aeronáutica e as ferramentas de CFD

Motivação:

- Evolução dos computadores;
- Redução de custo;
- Engenharia reversa;
- Flexibilidade/aplicabilidade.



REMINGTON RAND
UNIVAC

Not on the Drawing Board, Not "On Order"...
IN ACTUAL BUSINESS USE!

The Remington Rand Univac is the *only* completely self-checked electronic data-processing system now being delivered... the only one actually proven in business use. No comparable system handles alphabetic and numeric data to turn out payrolls, control inventories, and perform the other down-to-earth routine tasks vital to American industry.

In today's competitive market, the company which cuts its overhead *first* comes out on top. Univac is already at work in many organizations, so don't wait until 1956... 1957... or 1958 to

cash in on the tremendous savings available with this large-scale electronic business system. The time to act is now, to prevent your lagging perilously behind competition in the years to come.

There's no need to wait for equipment which is "just around the corner." Read why, in an impartial article on electronic computing for business, written by management consultants of a nationally known public accounting firm. Write to Room 1267, at the address below, for your free copy of this informative survey, "Electronics Down To Earth."

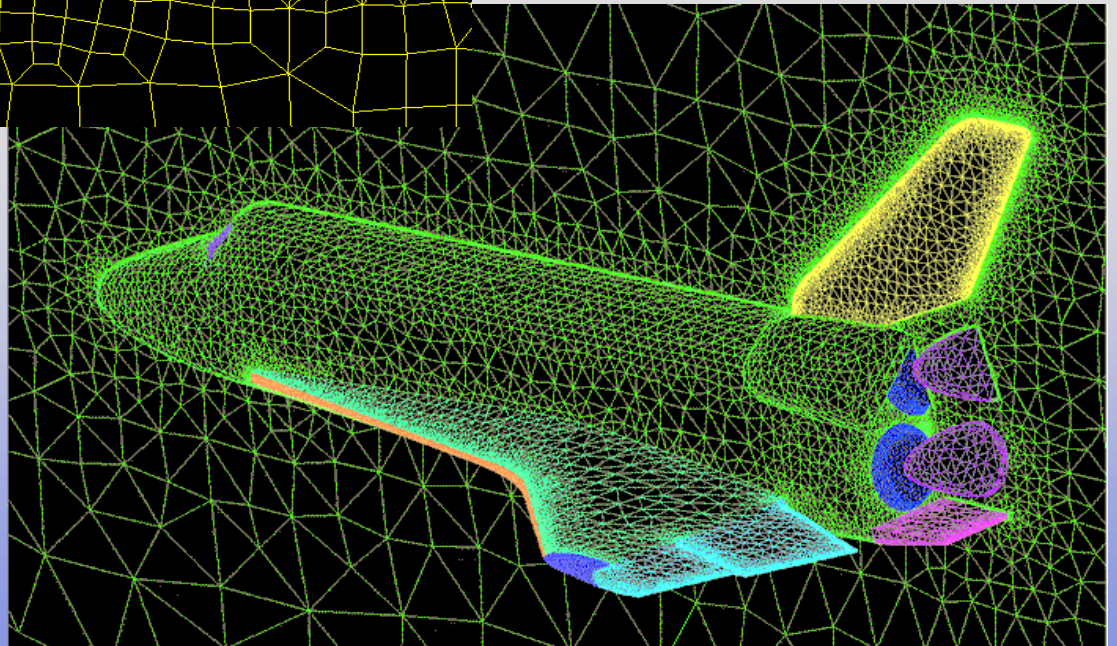
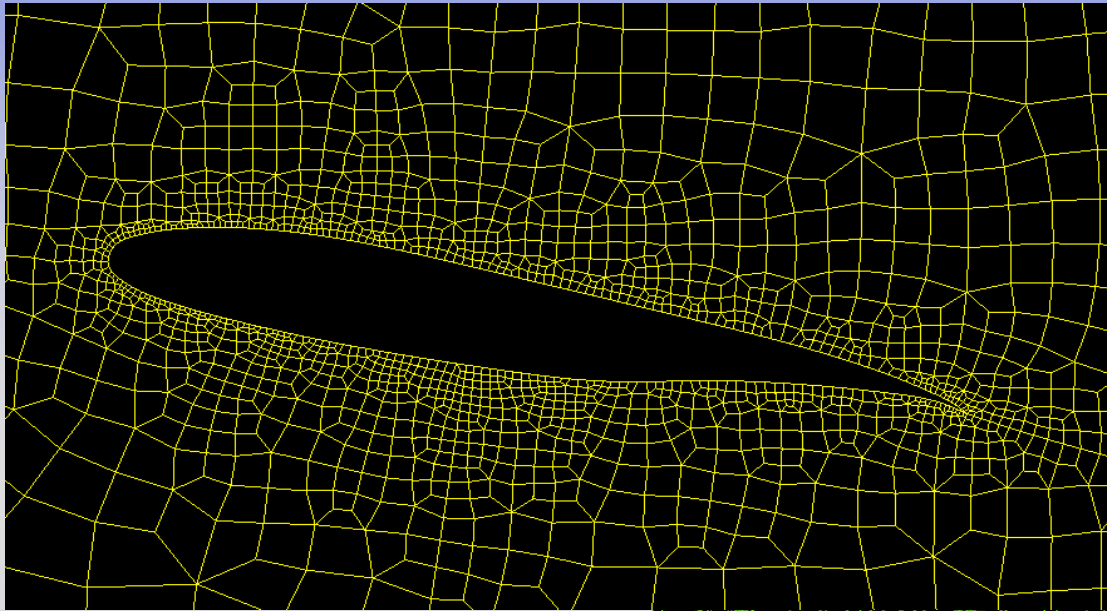
Remington Rand
Electronic Computing Department • 315 Fourth Avenue • New York 10

Modelo matemático do escoamento:

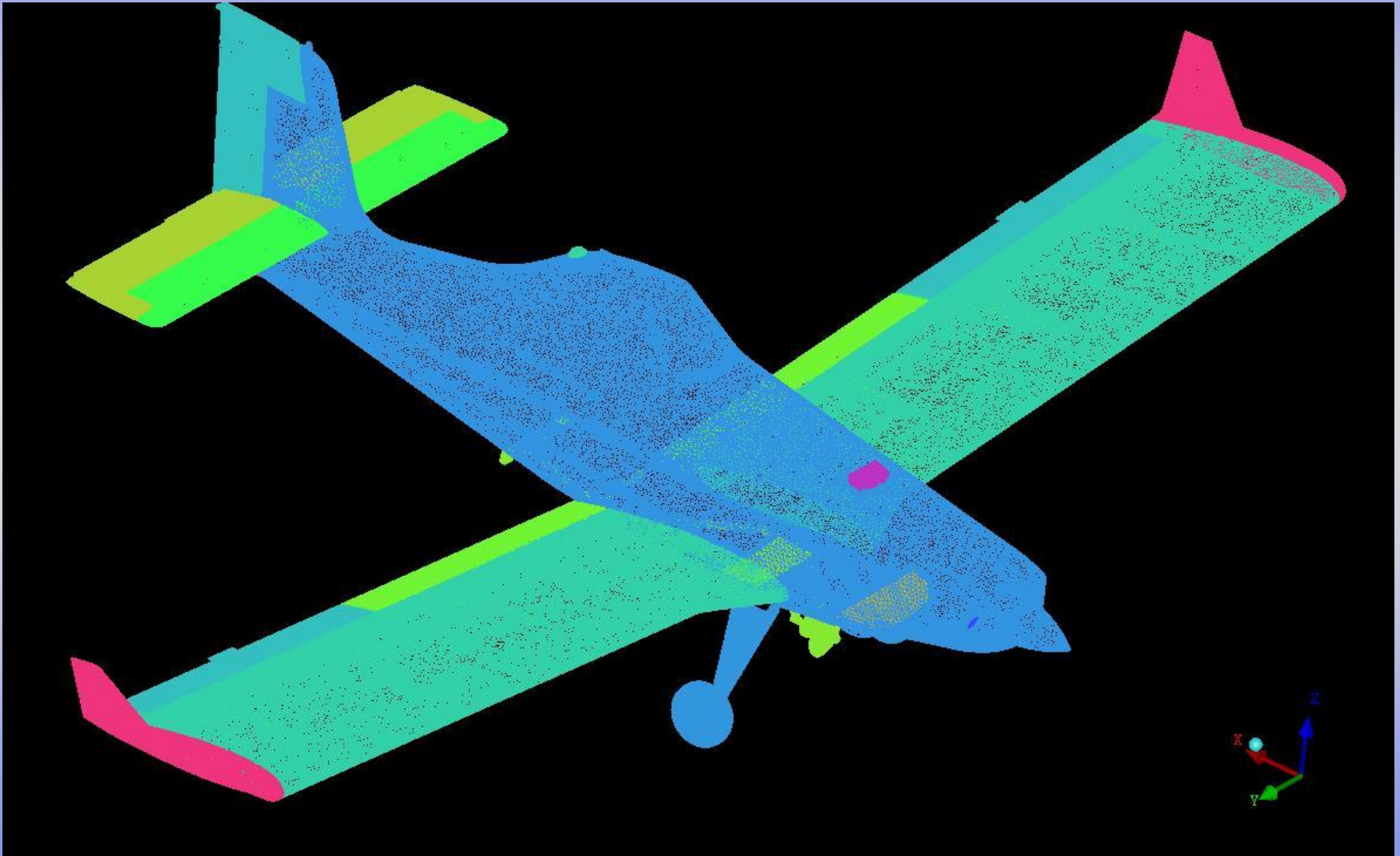
- Conservação de massa (continuidade);
- Quantidade de movimento (momentum);
- Energia.

$$\left\{ \begin{array}{l} \frac{\partial \rho}{\partial t} + \nabla \cdot (\rho \vec{V}) = 0 \\ \frac{\partial(\rho \vec{V})}{\partial t} + \nabla \cdot (\rho \vec{V} \vec{V}) = -\nabla p + \nabla \cdot \vec{\tau} + \rho \vec{f} \\ \frac{\partial(\rho E)}{\partial t} + \nabla \cdot (\rho E \vec{V}) = \nabla \cdot (\vec{\tau} \cdot \vec{V} - p \vec{V} + \kappa \nabla T) + \rho \vec{f} \cdot \vec{V} + \rho \dot{q} \end{array} \right.$$

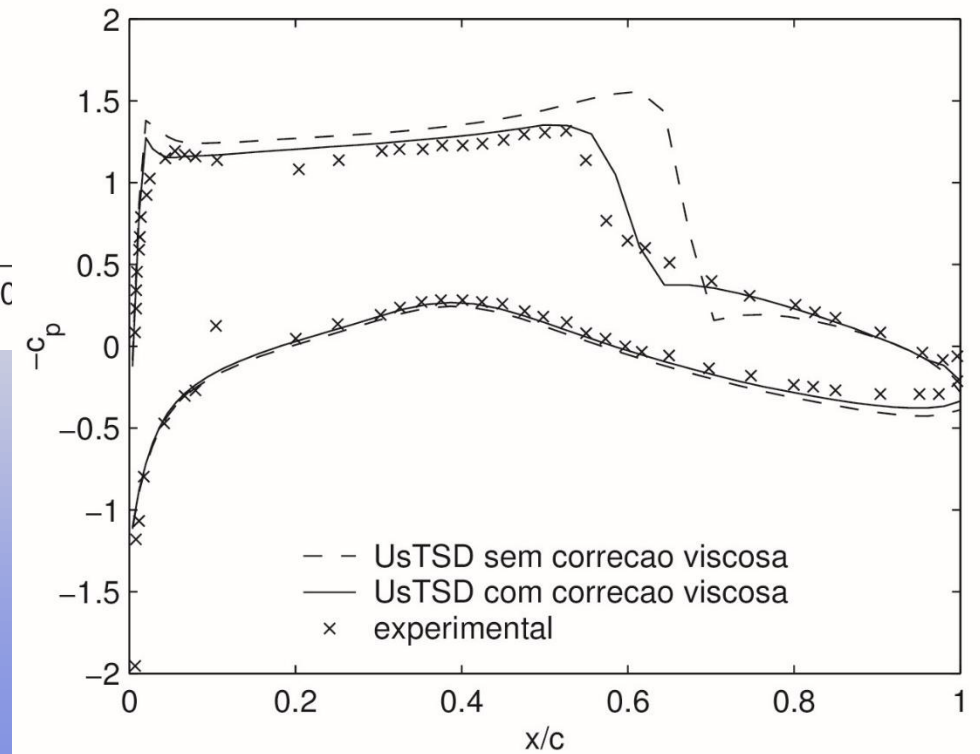
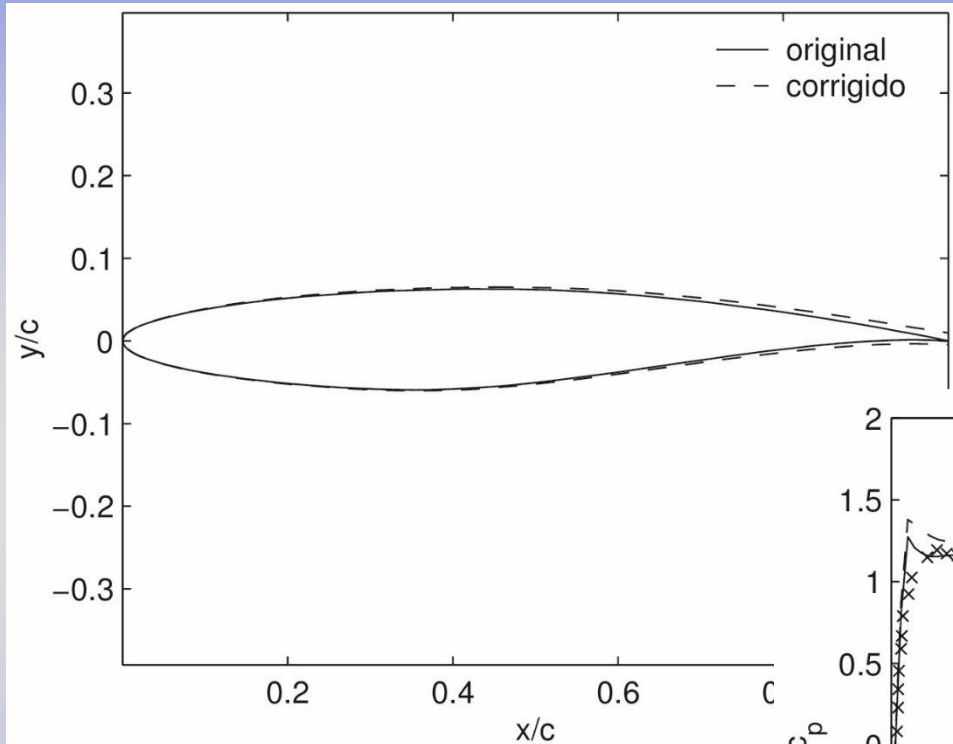
Malhas computacionais



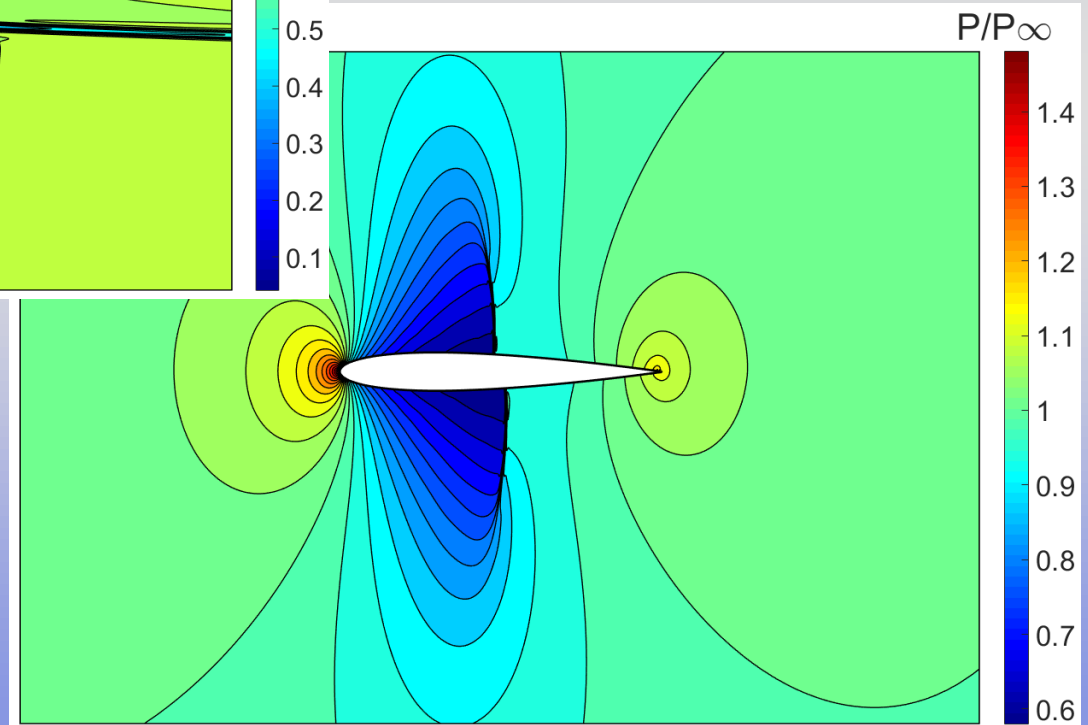
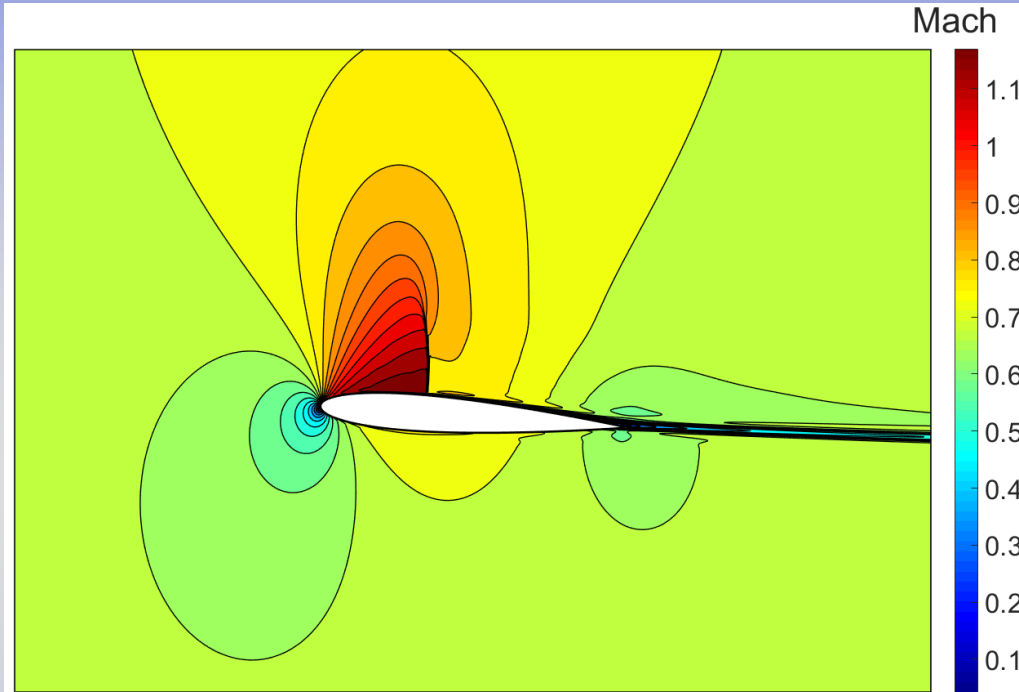
Malhas computacionais



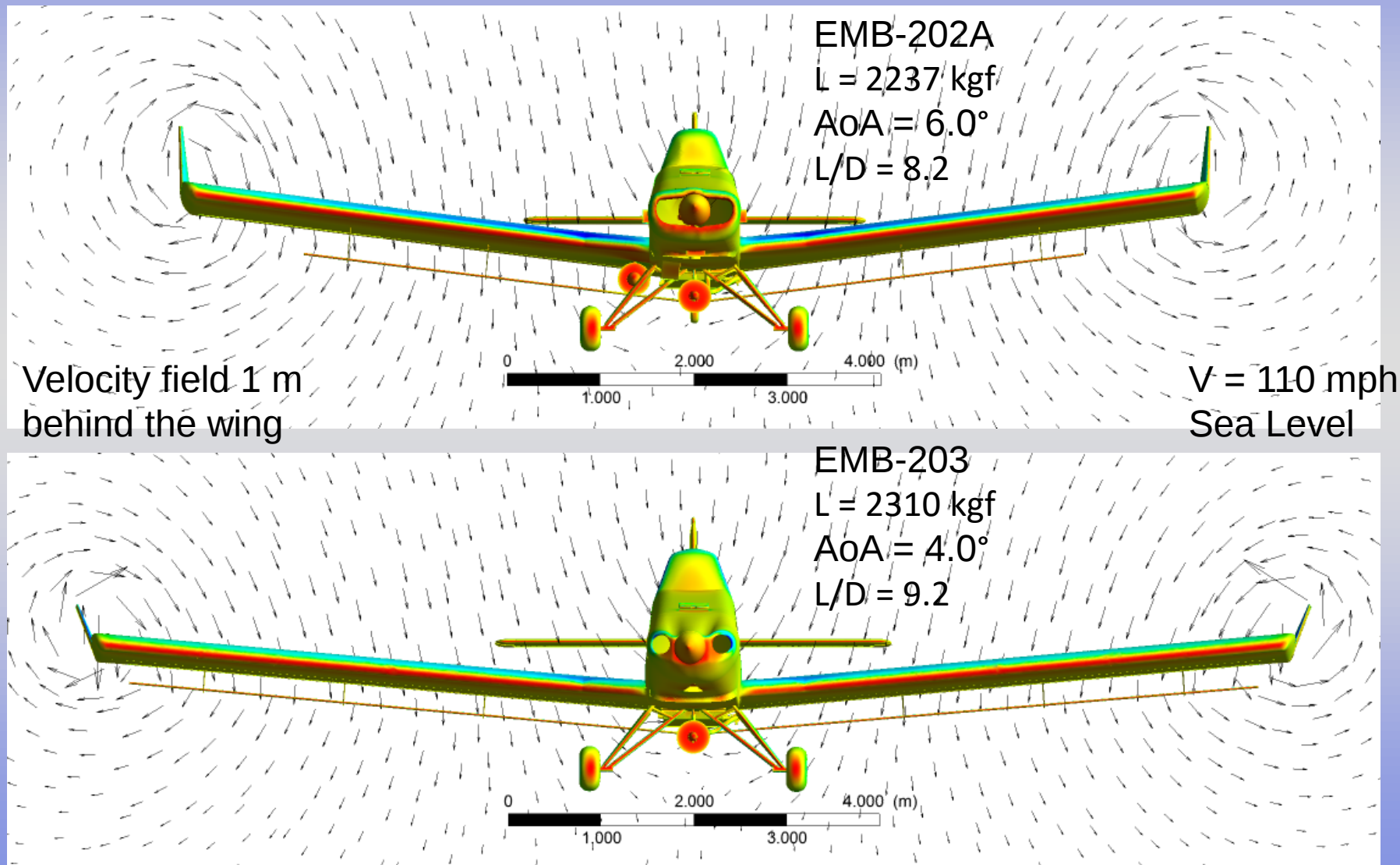
Interação entre onda de choque e camada limite



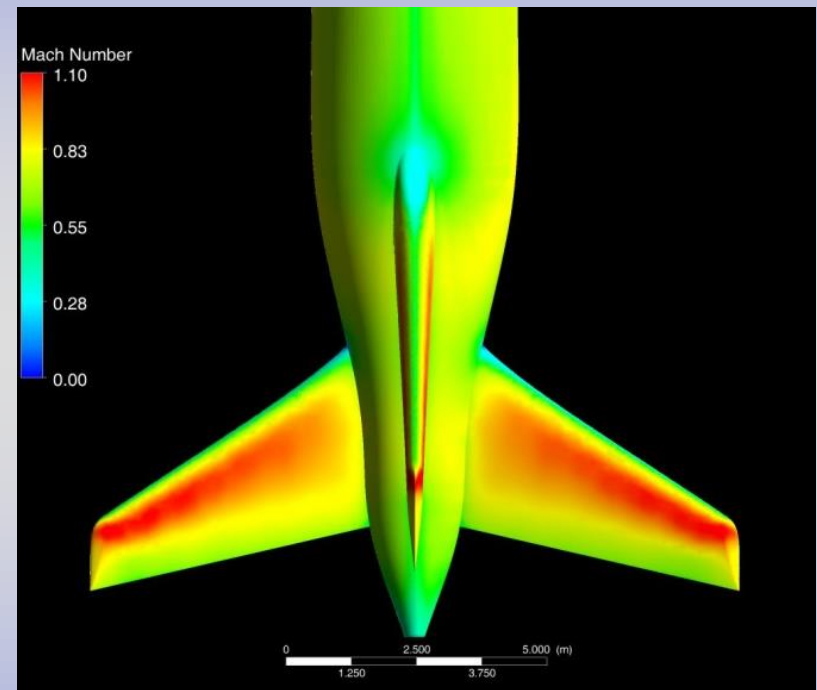
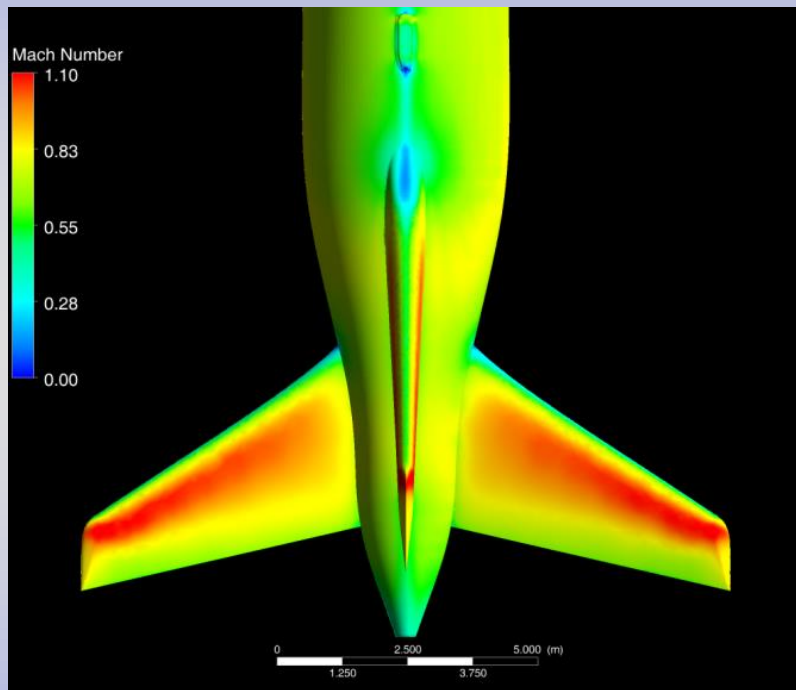
Métodos de fronteira virtual



Análise de modificações no Ipanema

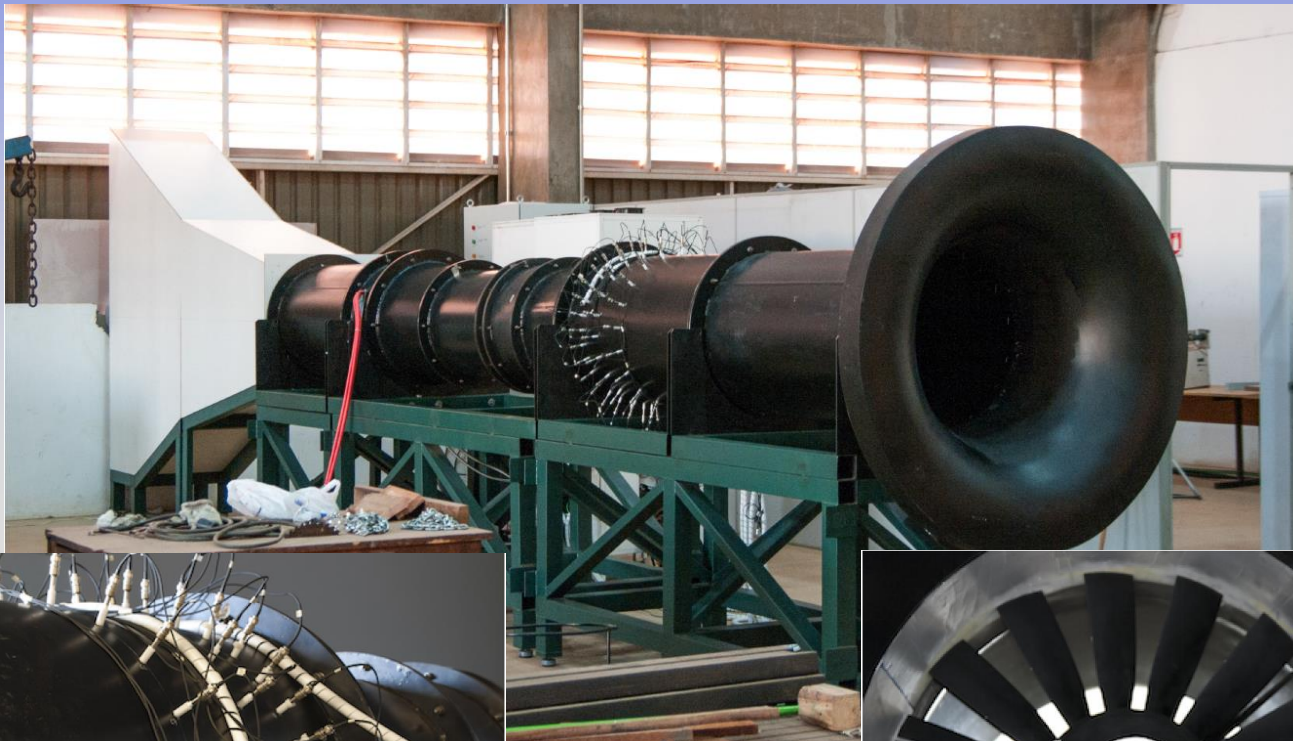


Resultado para um A319



Mach number distribution on the tail with (left) and without (right) the HGA7001 antenna for Flight Condition 1.

Bancada de ensaios de ruído de fan

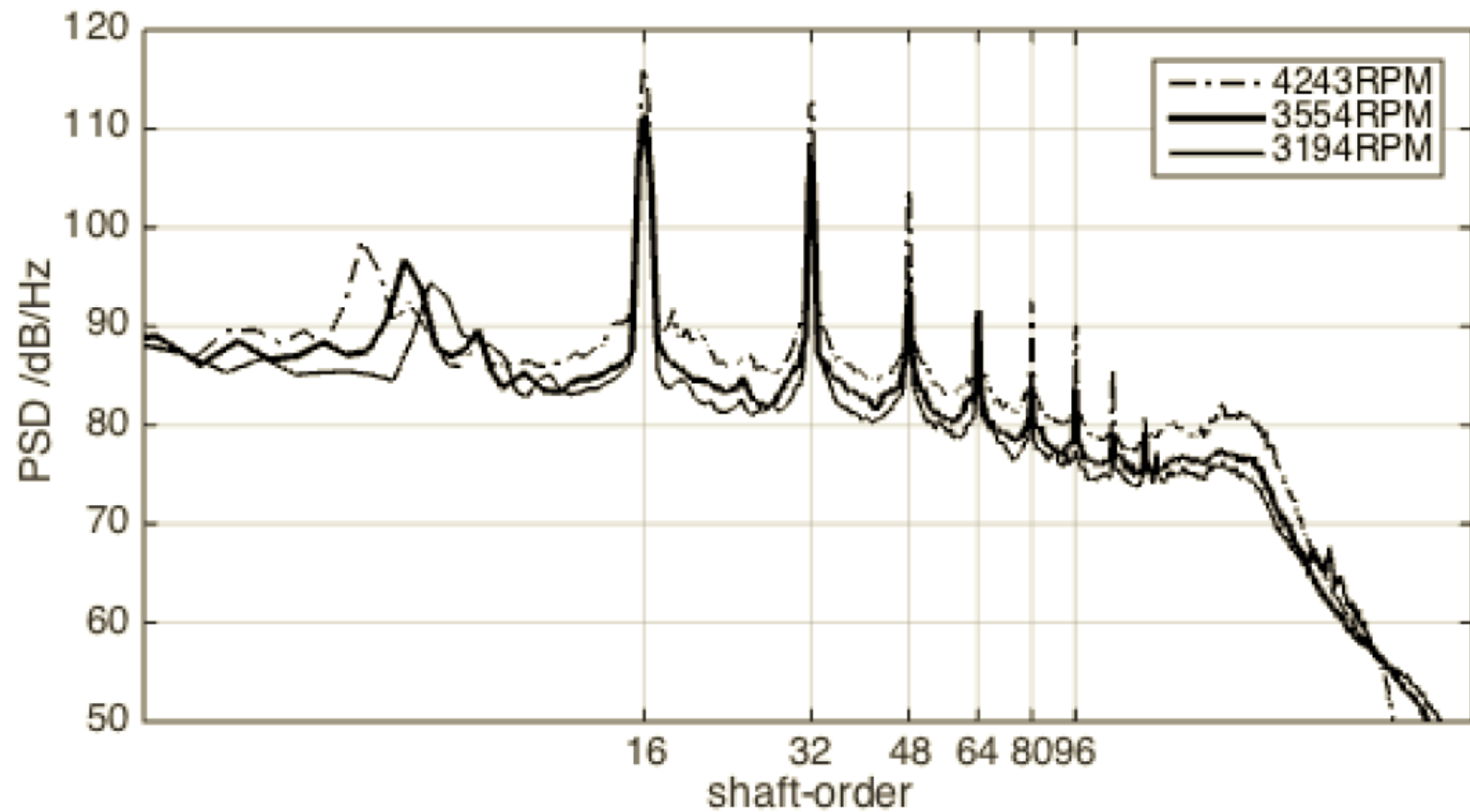


Microphone array

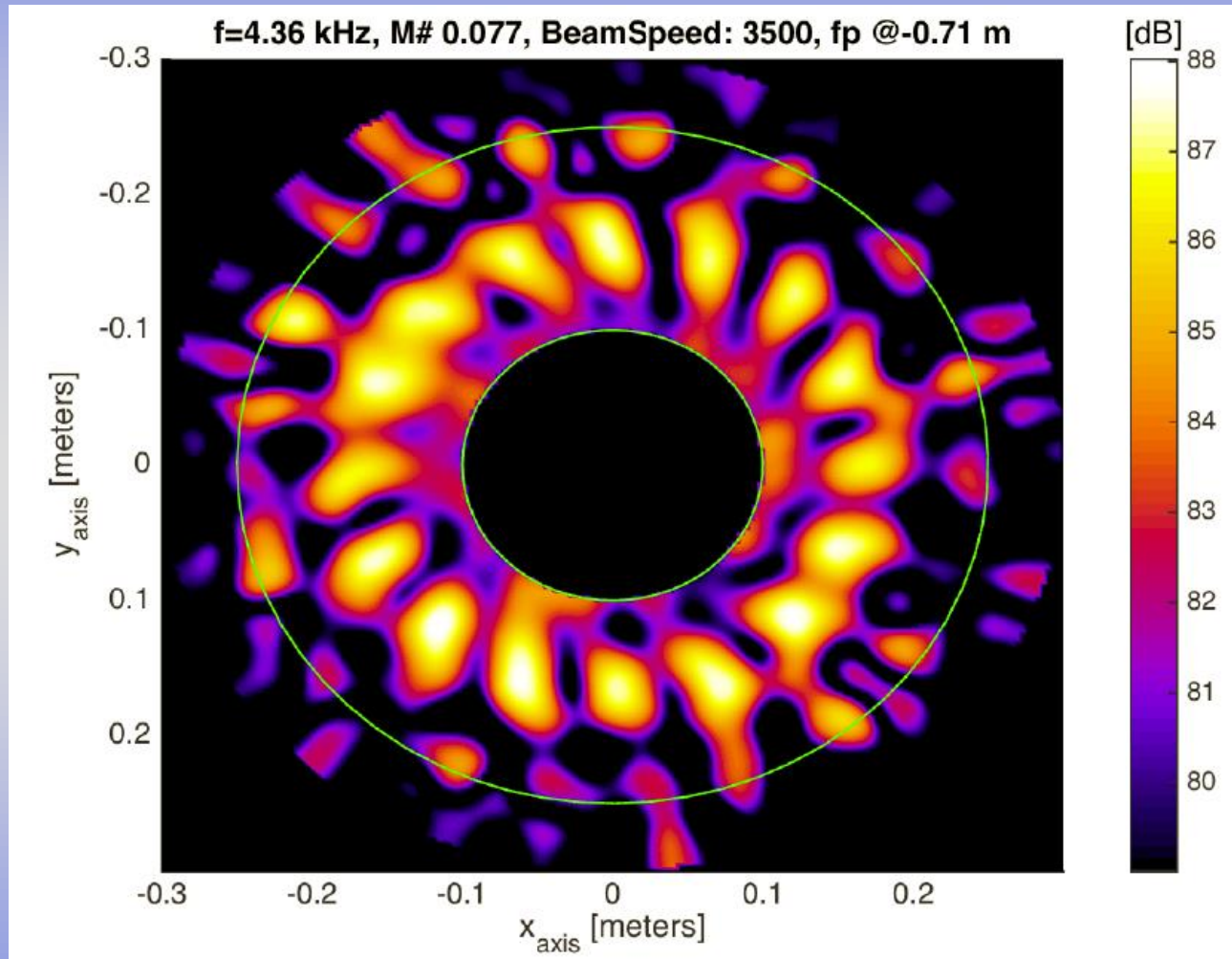


Rotor and stator assembly

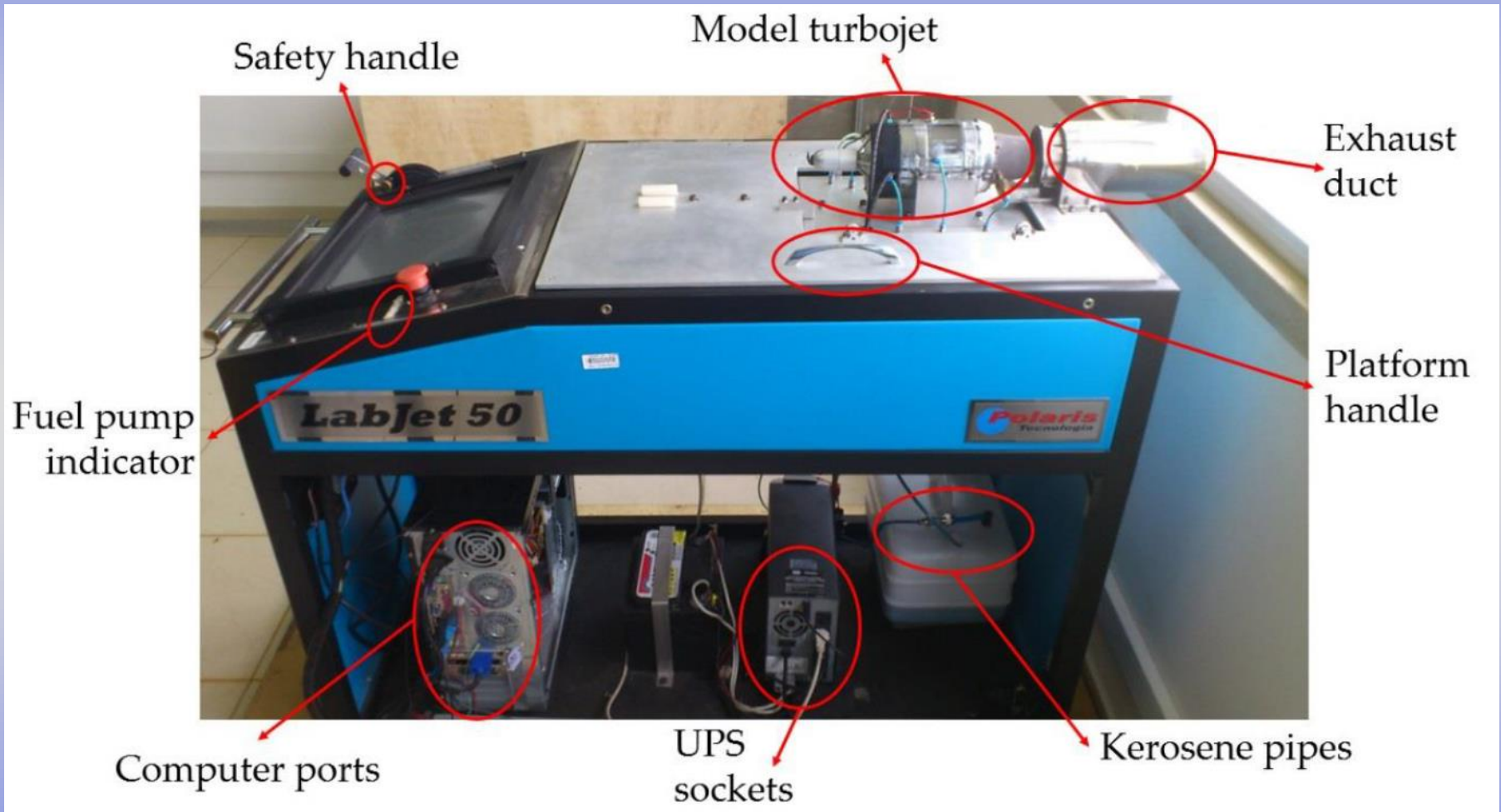
Análise espectral



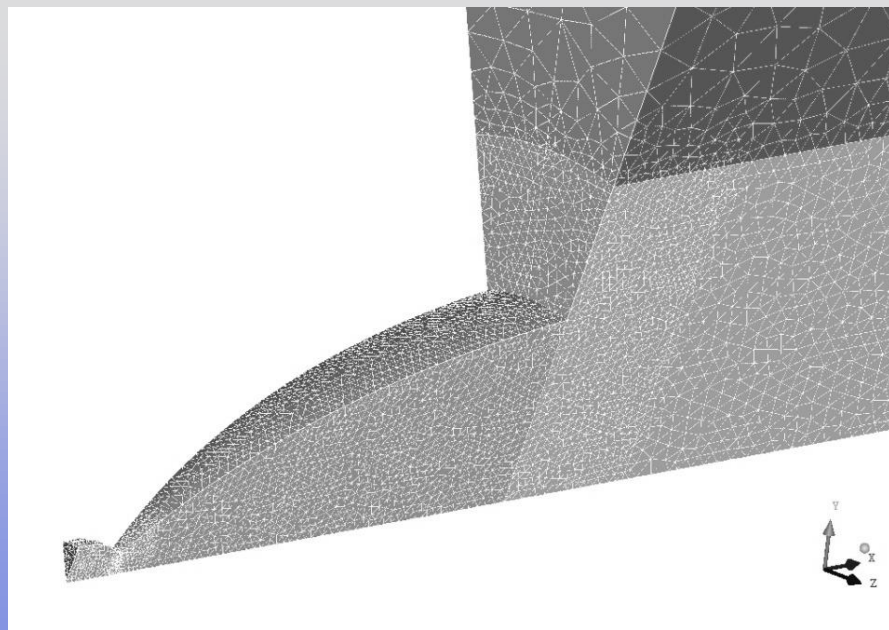
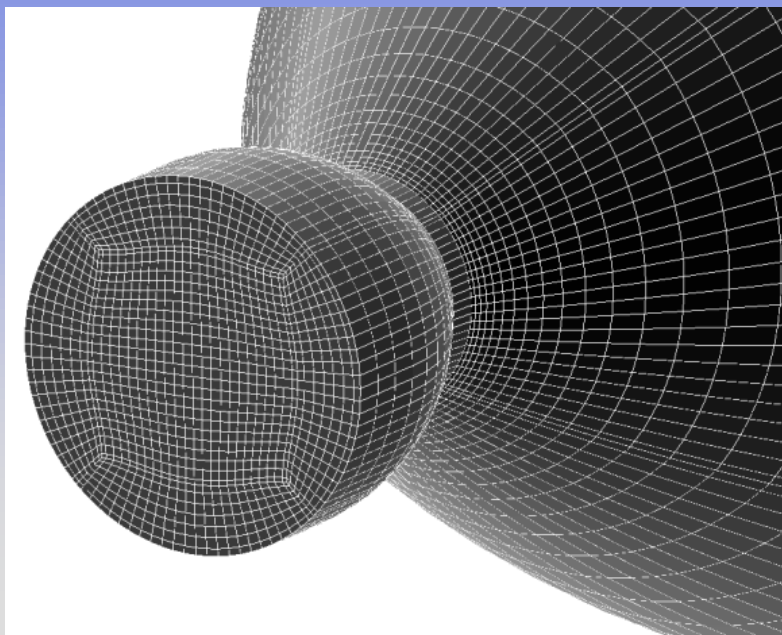
Beamforming



Bancada de motor a jato



Desempenho de Bocais do Tipo Sino e Aerospike Linear



Número
de Mach

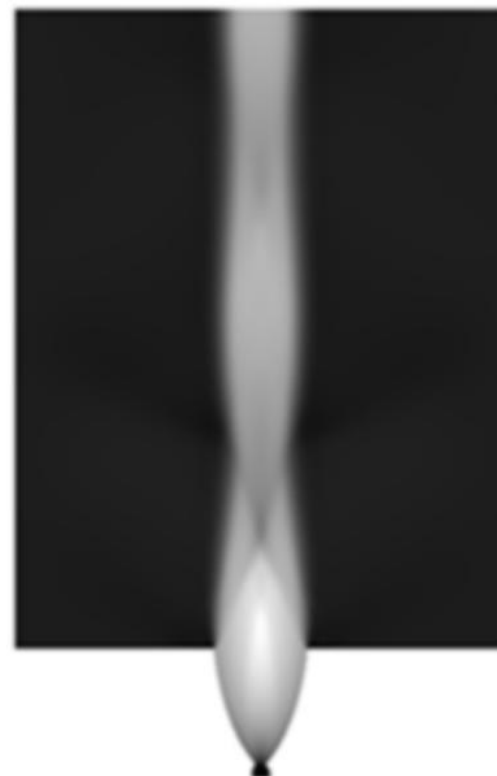
6.4

4.8

3.3

1.7

0.1



Número
de Mach

5.1

3.8

2.5

1.3

0



Análise de empuxo

