

Análise de Simulação CFD: Honda Fit 2015

Aproveitamento de Estudos
Extraordinários em Aerodinâmica Veicular
Marco Antônio Zolett Rosso

Dados de Referência



Dados de Referência

Honda Fit (2015)

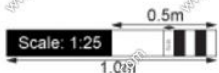


Available as



- Altura: 1525mm;
- Comprimento: 3995mm;
- Entre eixos: 2530mm;
- Largura: 1694mm.

- CD estimado: [0.3](#).

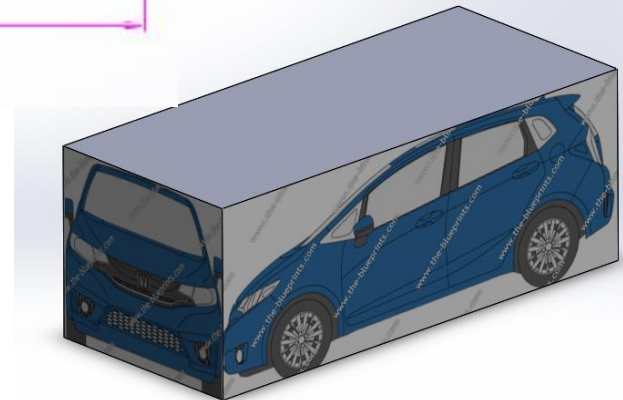


All measurements in millimeters

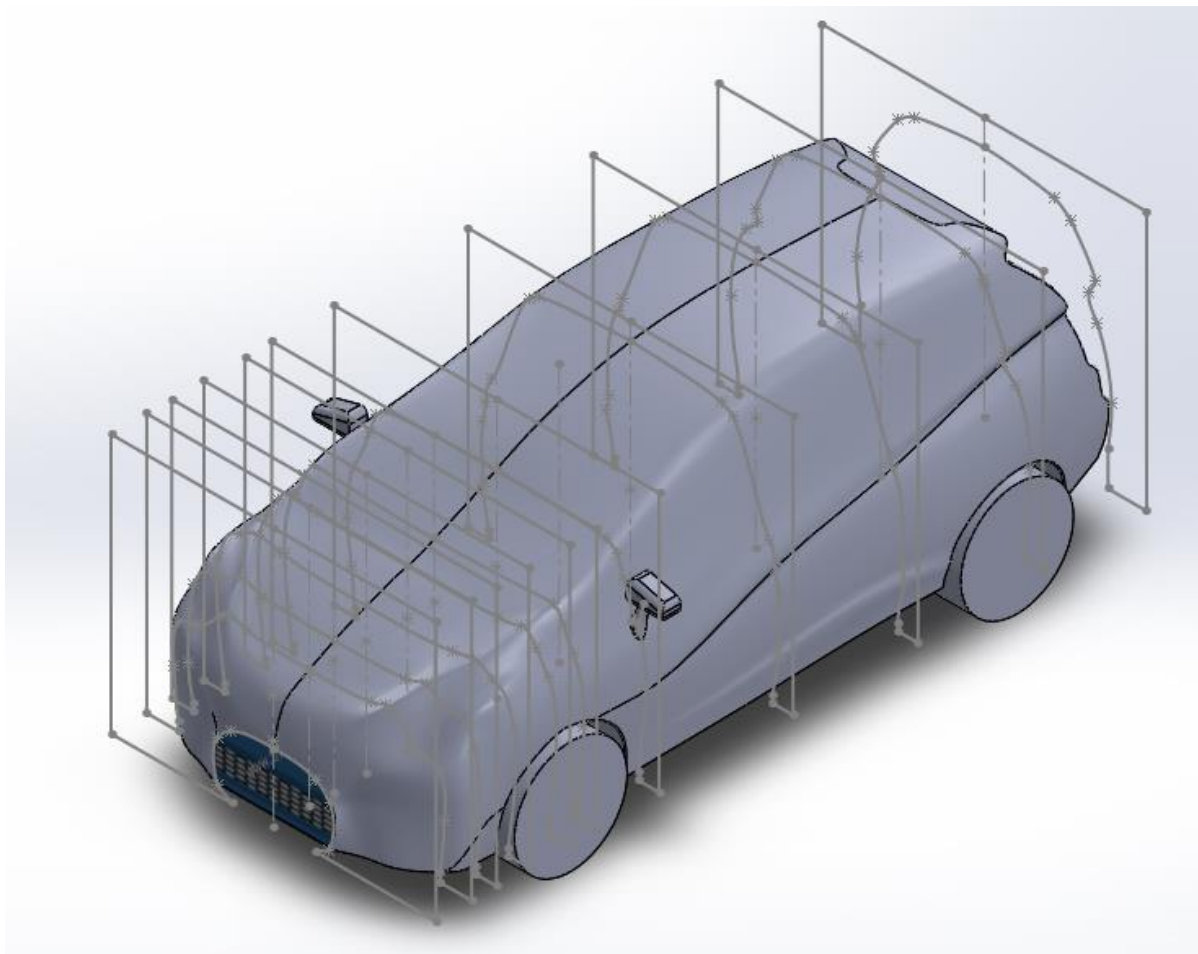
Modelo



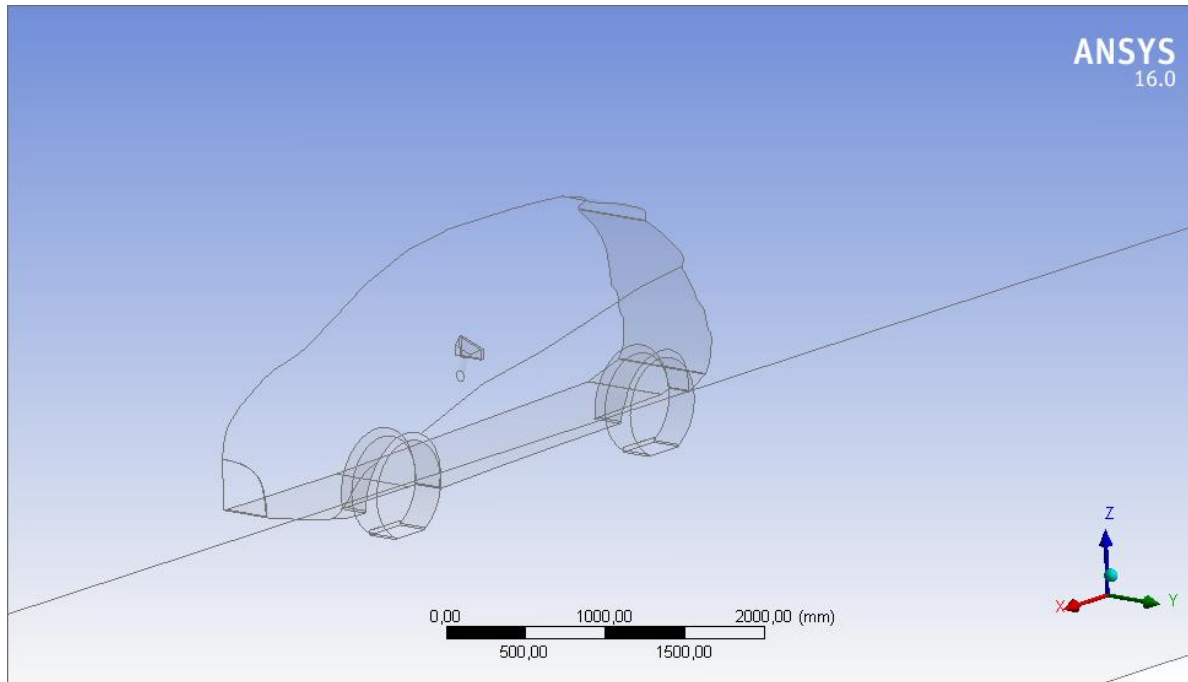
4000 ±0,50



Modelo



Modelo

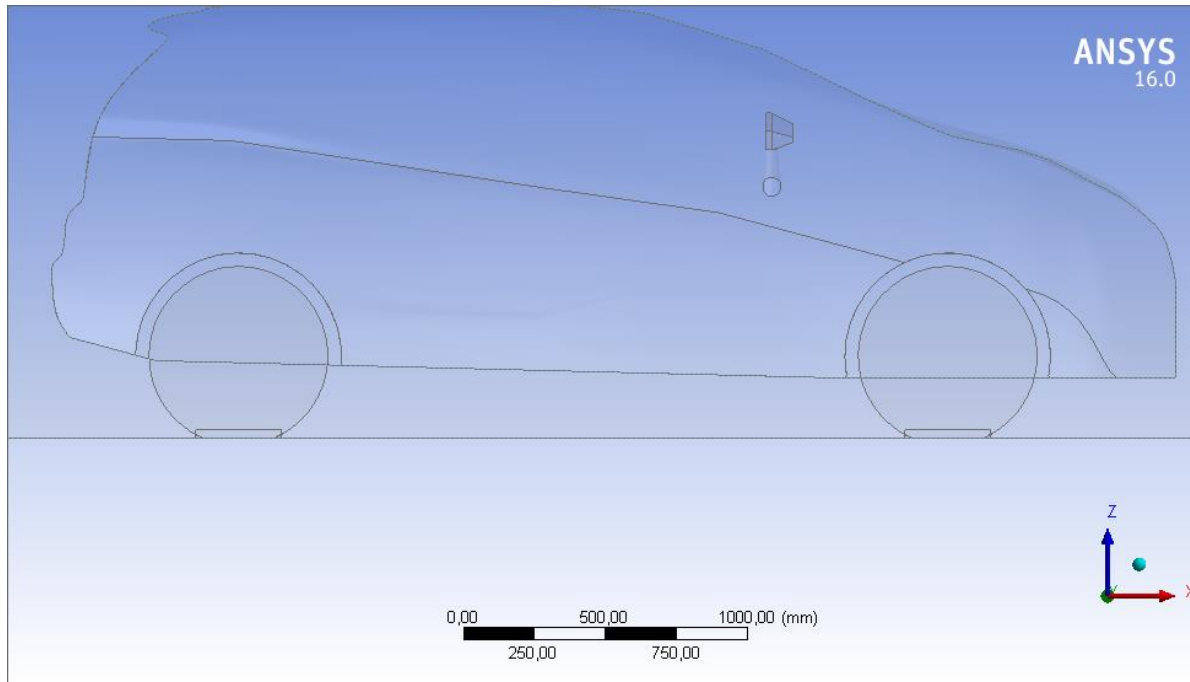


2 Planos de simetria:

- Seção transversal do modelo, plano XZ;
- Solo, plano XY.

Túnel preenchido com ar e o volume do modelo é subtraído.

Modelo



Intersecção pneu
pista 20mm;

Blocos para
intersecção
pneu/pista;

Fundir grade frontal.

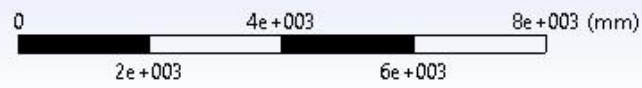
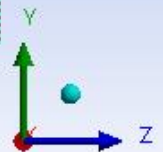
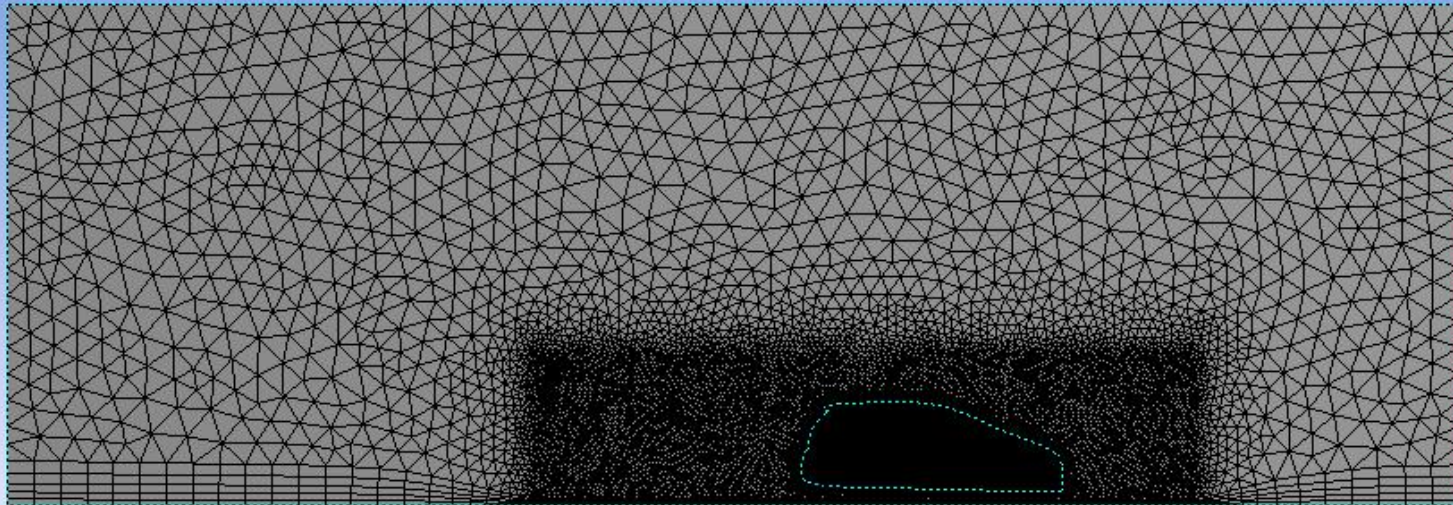
Malha

- Estratégia: Caixas e Controles
 - Túnel: 6x6x36m
 - 12m para frente e 20m para trás do modelo;
 - 3 planos de simetria, teto e laterais do túnel;
 - min=10mm, max=450mm, gr=1,2.
 - Superfícies: controlado pelo programa
 - Veículo, rodas, espelho e via;
 - es=20mm; min=12mm; gr=1,2;
 - First Layer Aspect Ratio. 5 layers.
 - Caixa de refinamento: 3x3x10m
 - es=75mm; min10; gr=1,2.

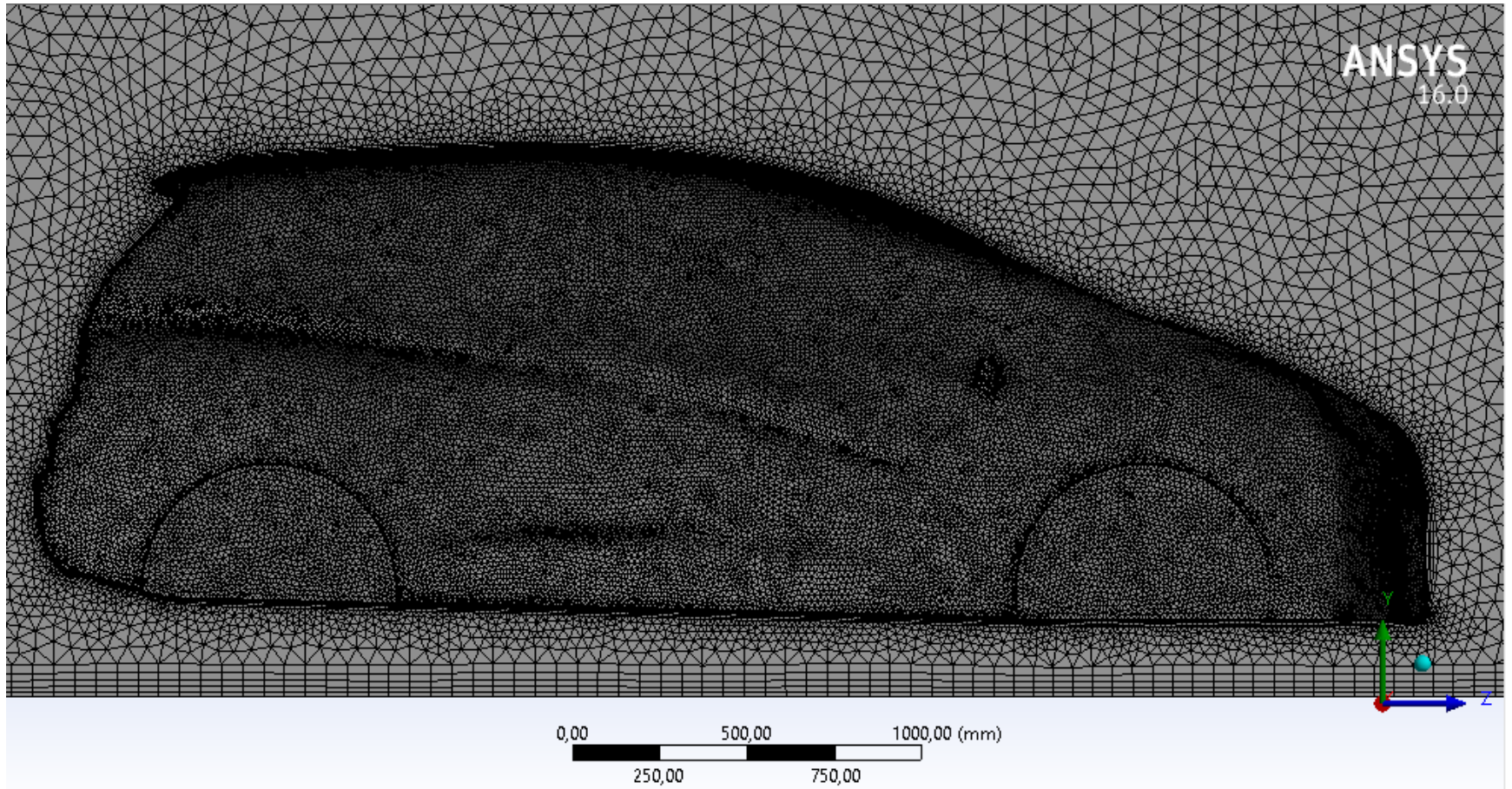
Malha



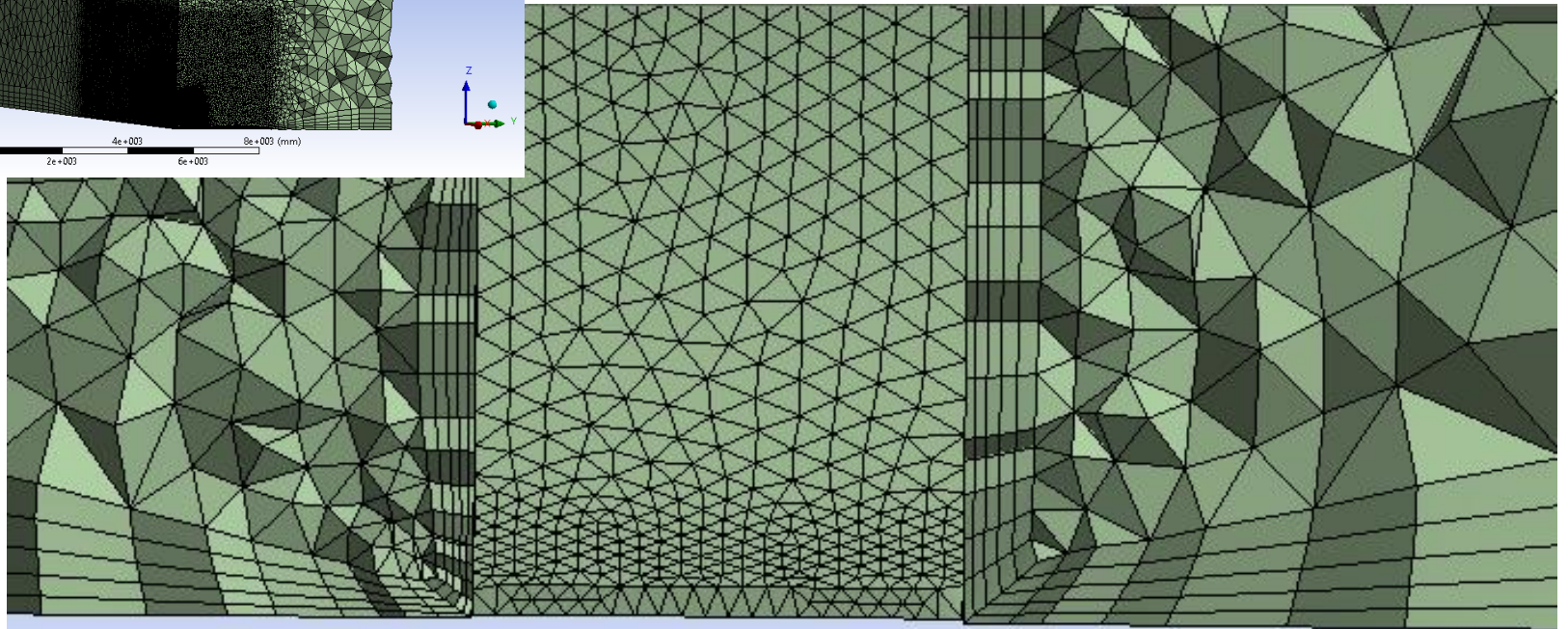
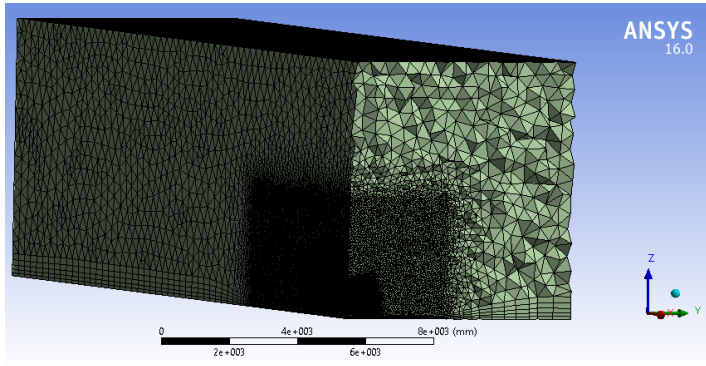
ANSYS
16.0



Malha



Malha



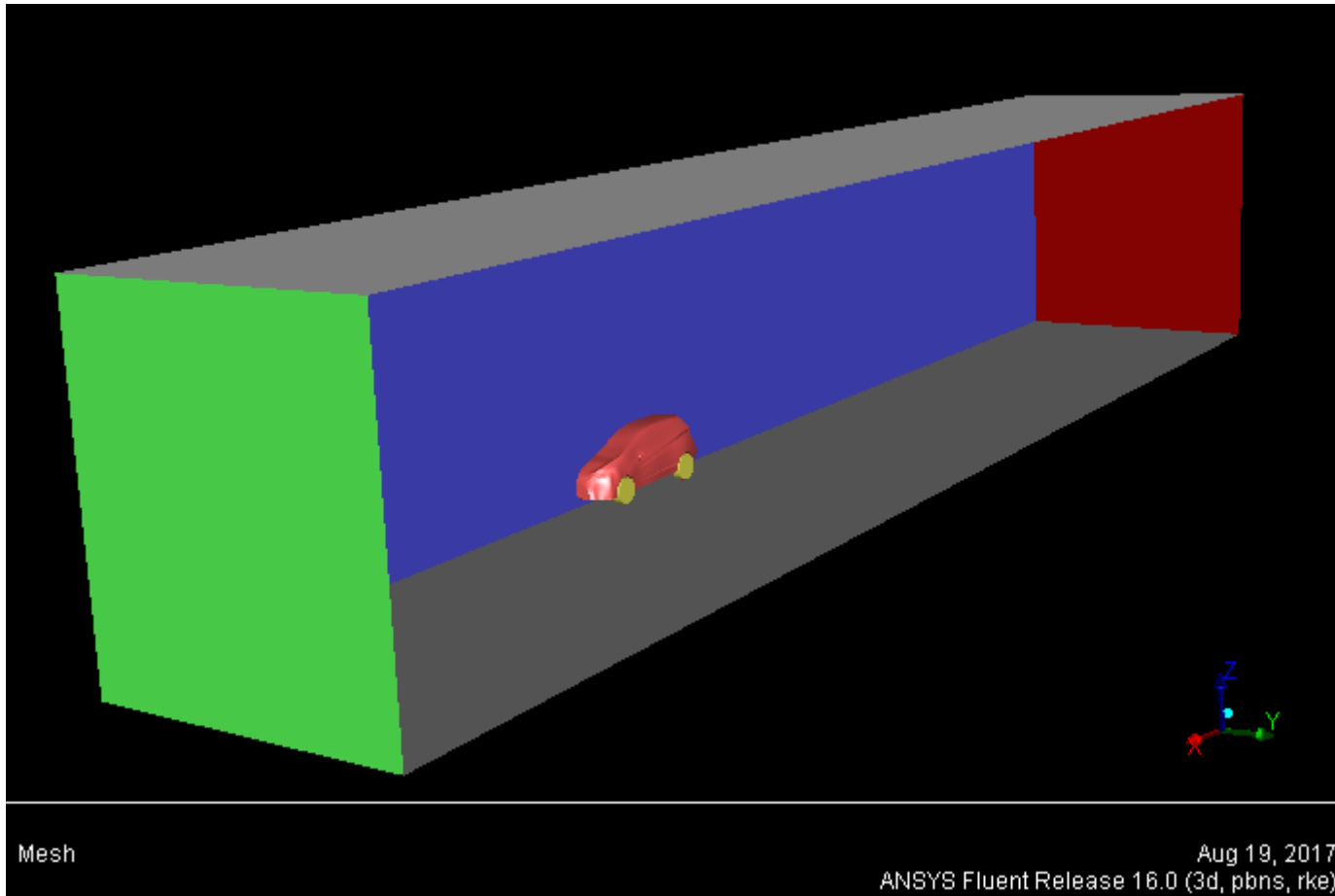
Malha

- Estatísticas:
 - 833271 nós;
 - 3707726 malha;
 - Skewness: max. 0,8951; média 0,2119;

mesh size & turbulence model	c_D	Δc_D	CPUhs
wind-tunnel experiment	0.321	-	-
coarse mesh (5.5 M cells) realizable k- ϵ	0.336	4.7 %	450
fine mesh (11 M cells) realizable k- ϵ	0.328	2.1 %	750
fine mesh (11 M cells) RSM	0.322	0.3 %	1200

Table 1: Comparison of results for different modeling approaches [1]

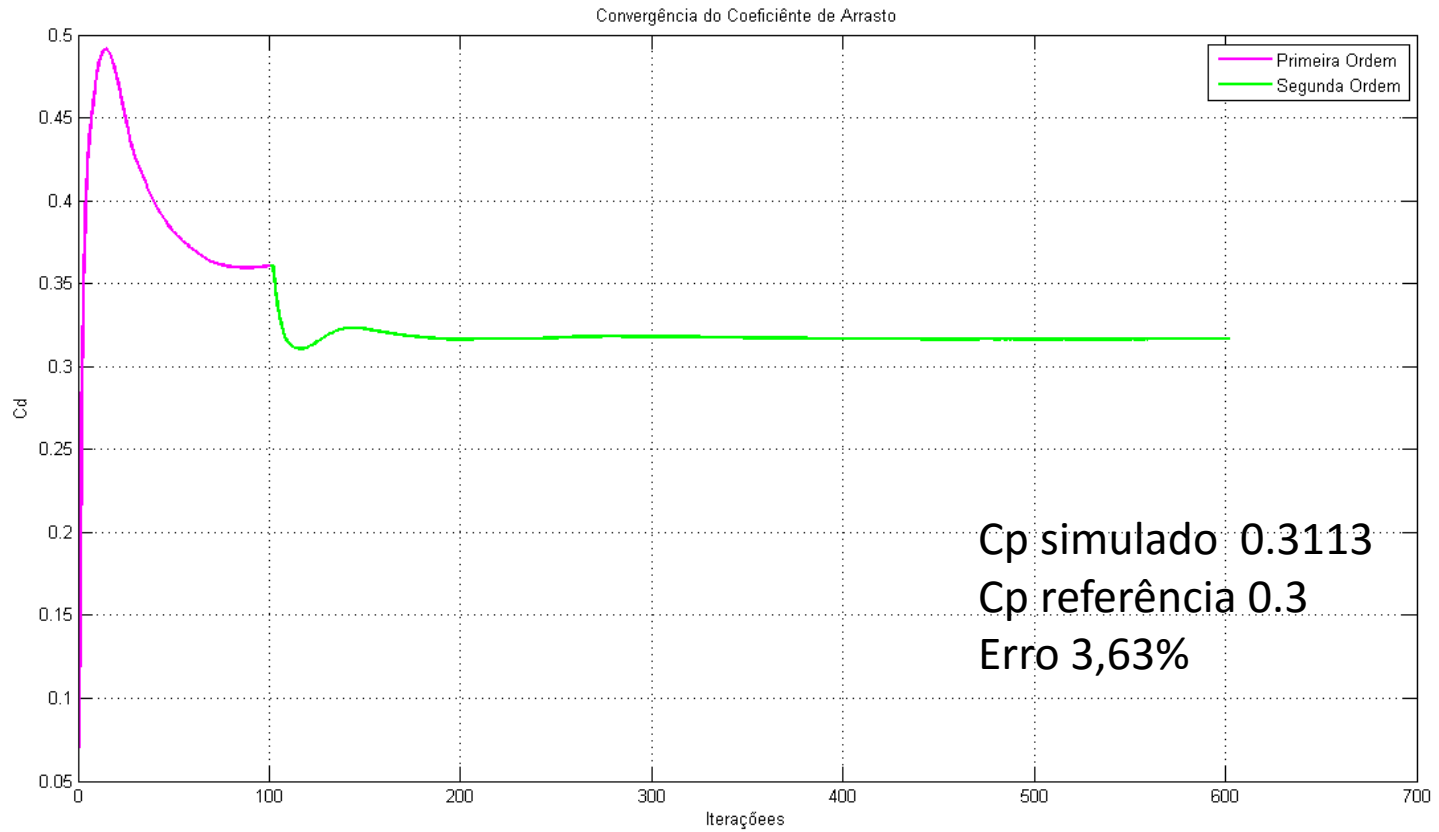
Configuração da Simulação



Configuração da Simulação

- Modelo de turbulência K- ϵ realizable e NWF
- Material:
 - ar ($\rho = 1,225$ [Kg/m³]; $\mu = 1,7894 \cdot 10^{-5}$ [N.s/m²]; $T = 288,16$ K)
- Condições de Contorno:
 - Velocidade na entrada = 40 m/s
 - Velocidade das rodas = 20 rad/s
 - Pressão na saída = pressão de operação = 101325 Pa
 - Modelo e via como paredes (área ref. 1,068482 m²)
 - Planos laterais e superior como simétricos

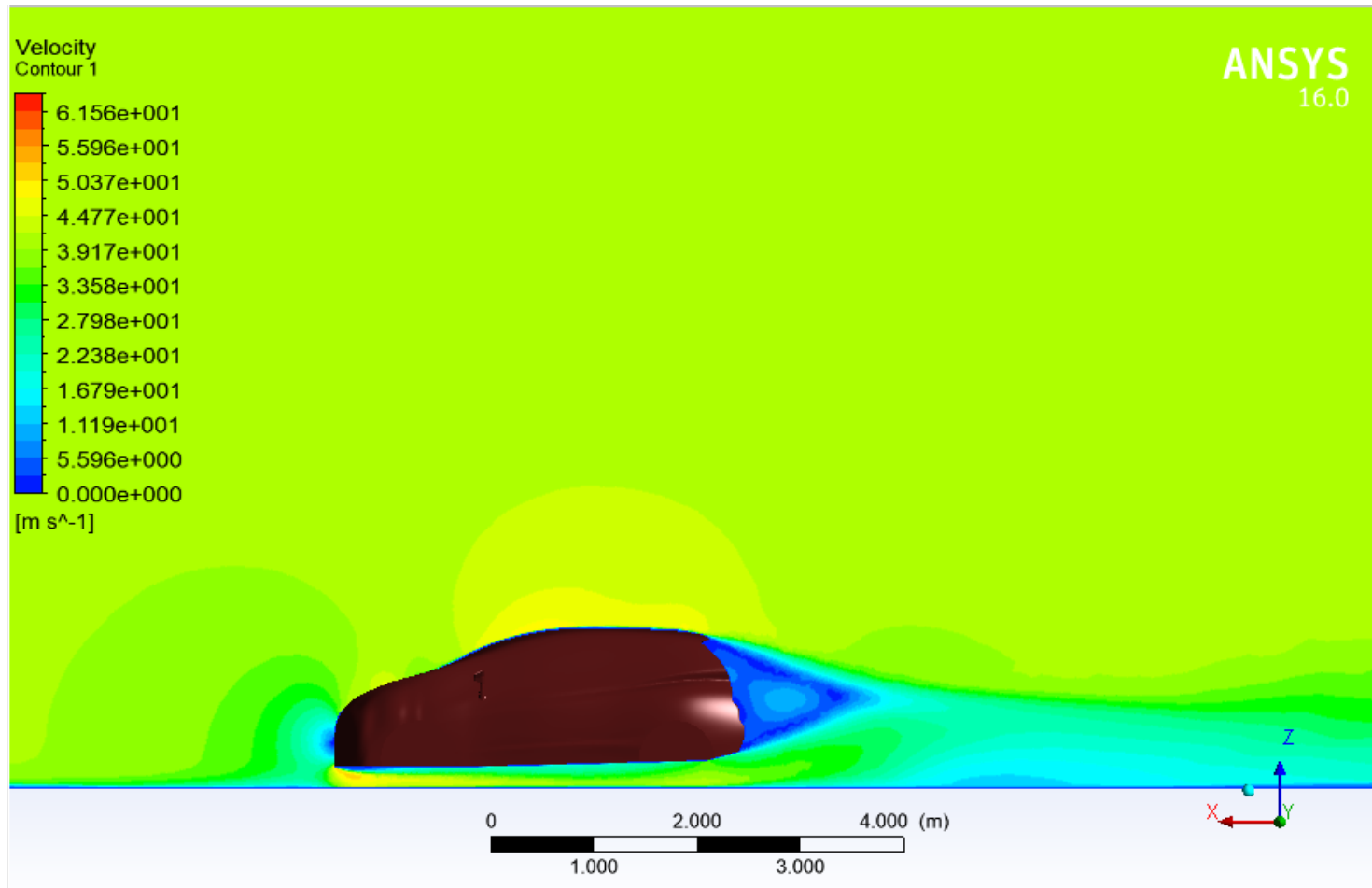
Resultados



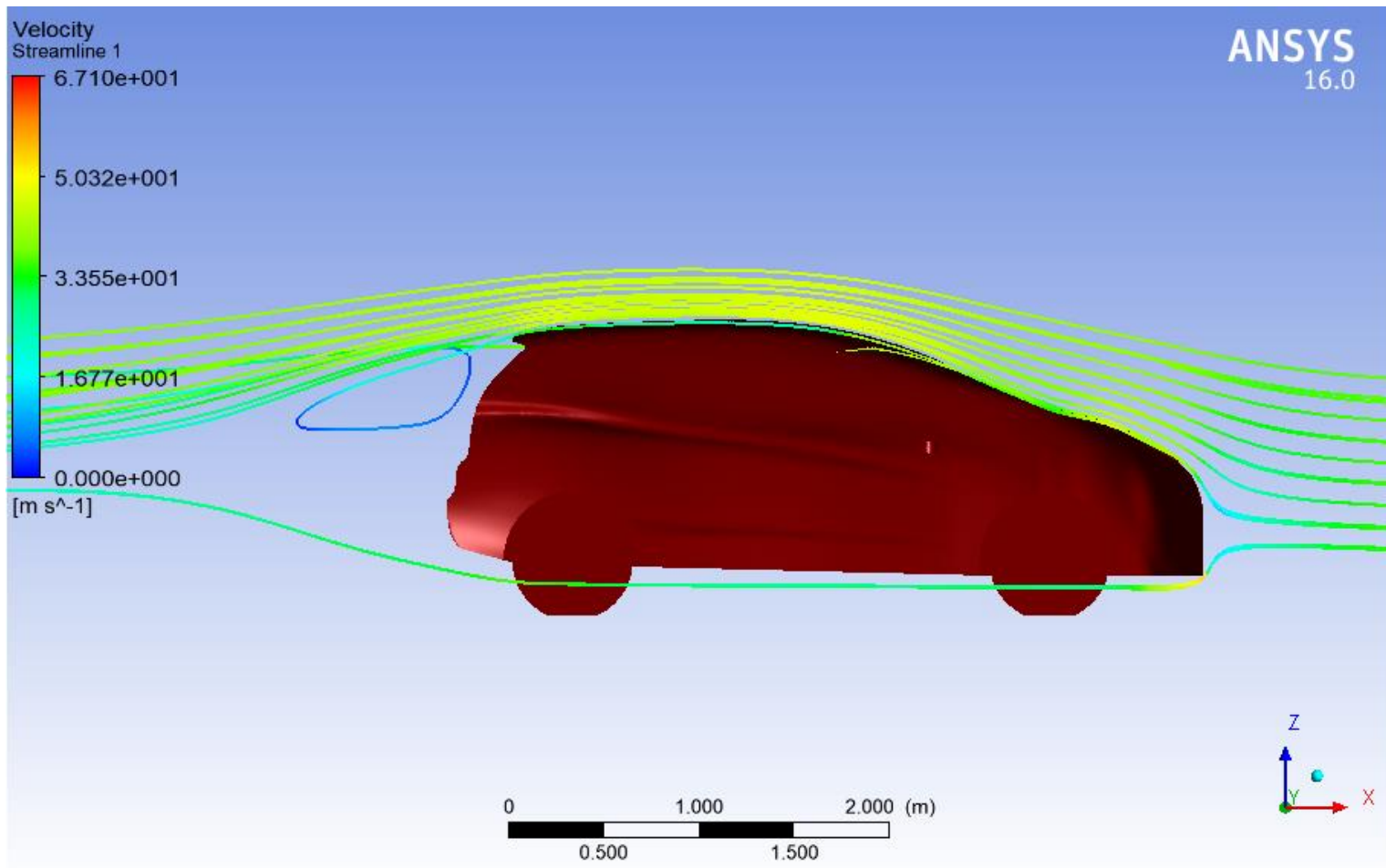
Resultados

- Força de Arrasto
 - Veículo: (P) 222 N; (v) 25 N;
 - Rodas: (P) 67 N; (v) 2,6 N;
 - Espelhos: (P) 11; (v) 0,4 N;
 - Total: 328 N
- Força de Sustentação
 - Veículo: (P) 222 N; (v) 25 N;
 - Rodas: (P) 67 N; (v) 2,6 N;
 - Espelhos: (P) 11; (v) 0,4 N;
 - Total: 328 N
- Momento de Arfagem no CG(pitch)
 - 482 Nm

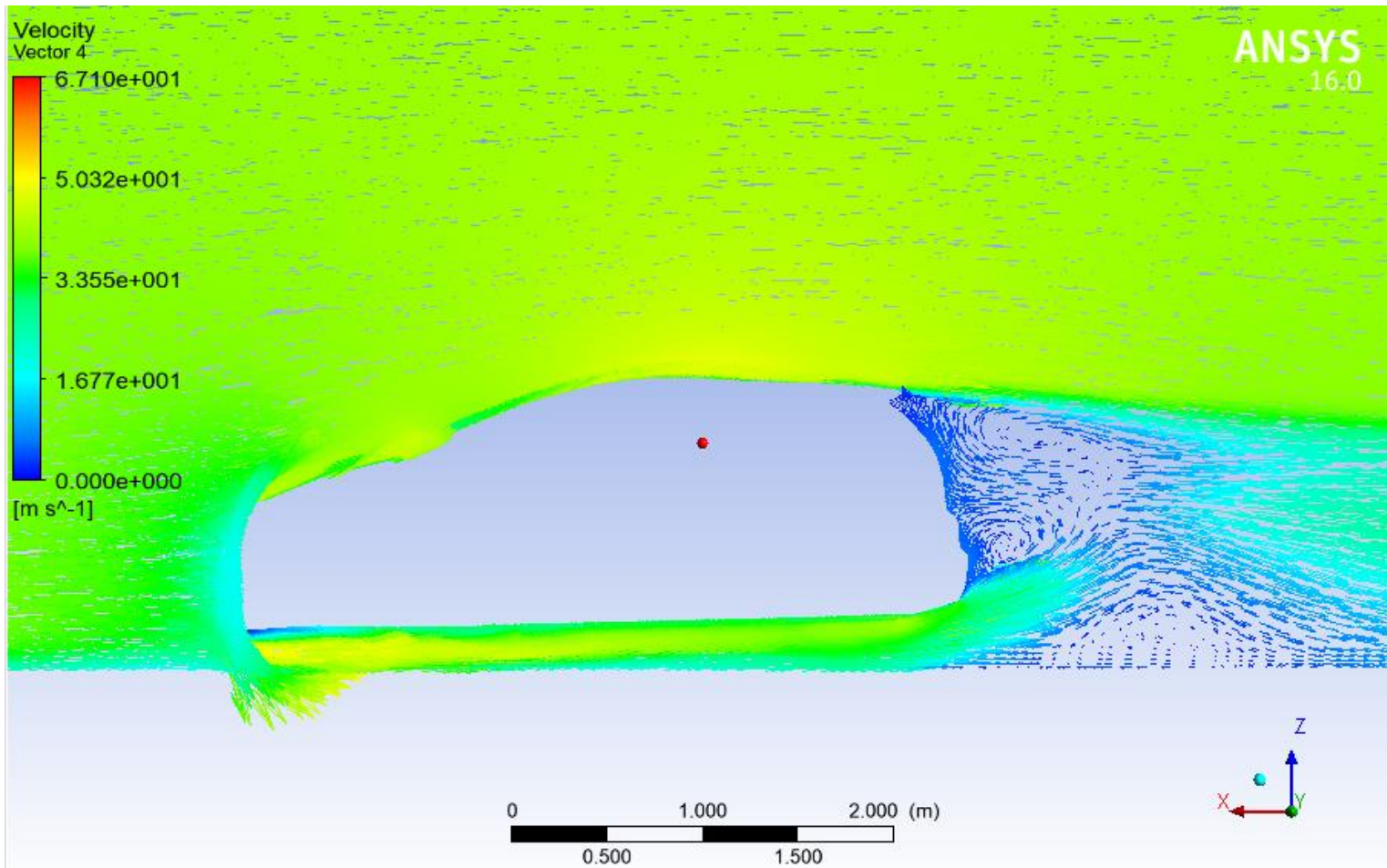
Resultados



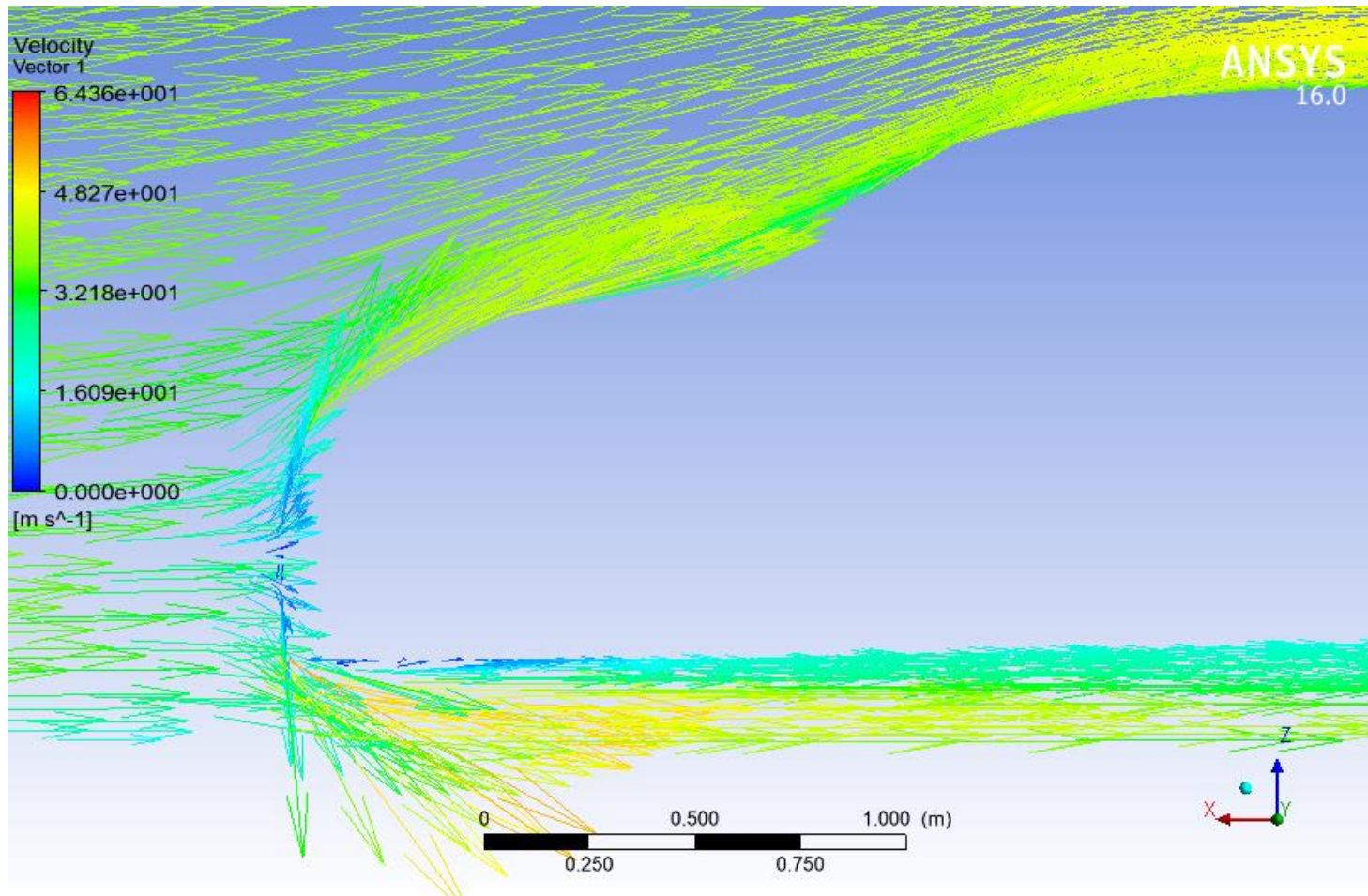
Resultados



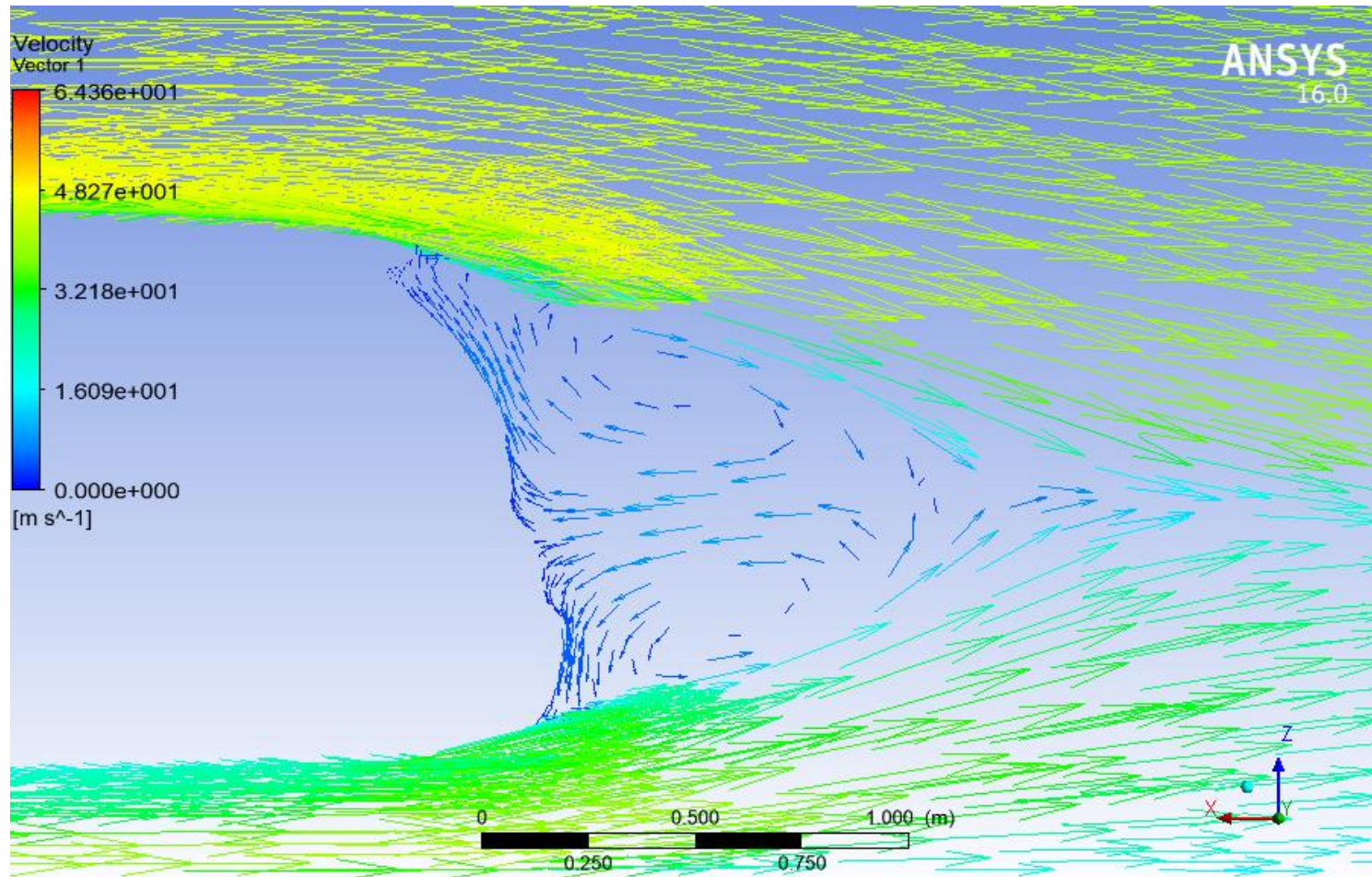
Resultados



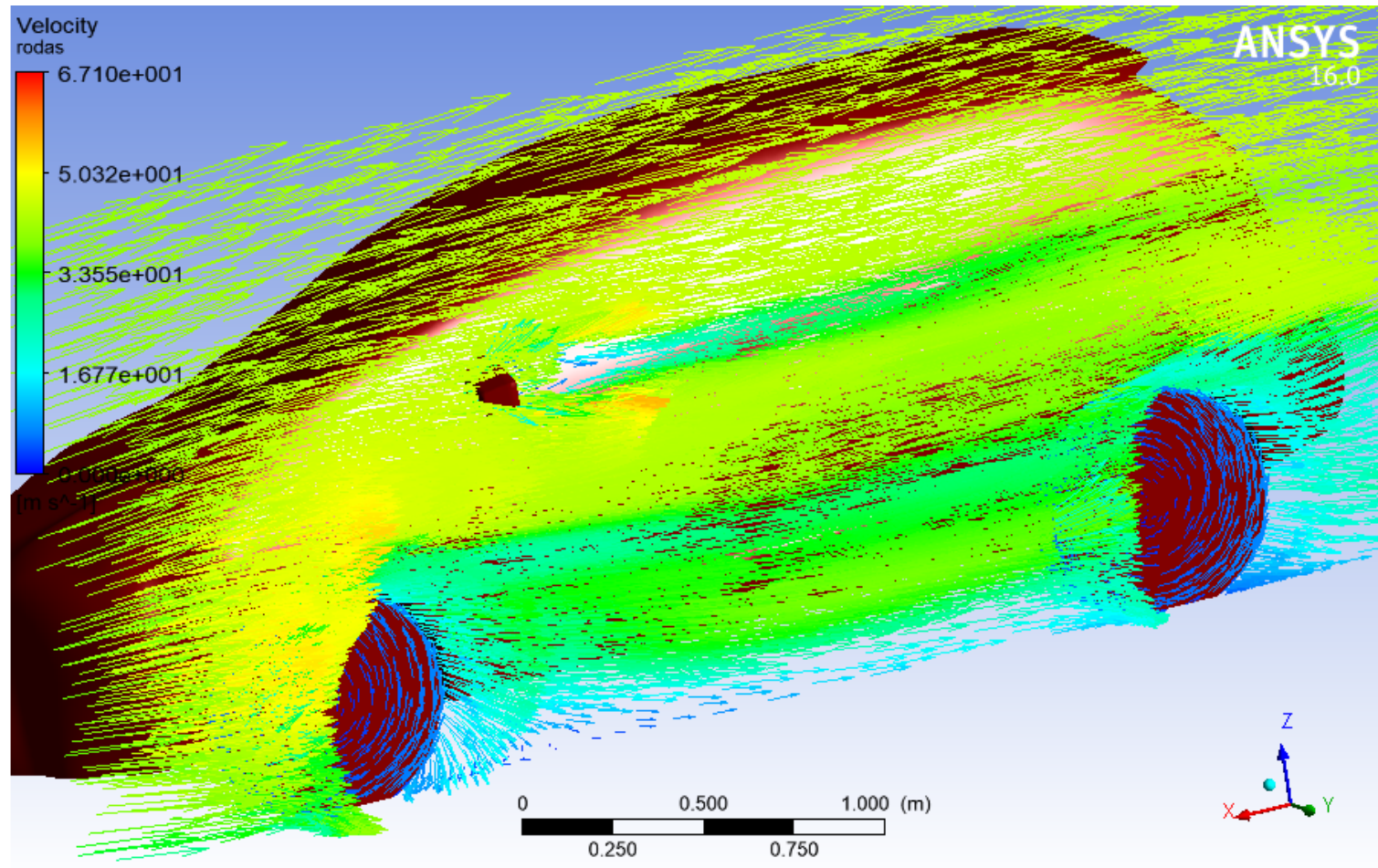
Resultados



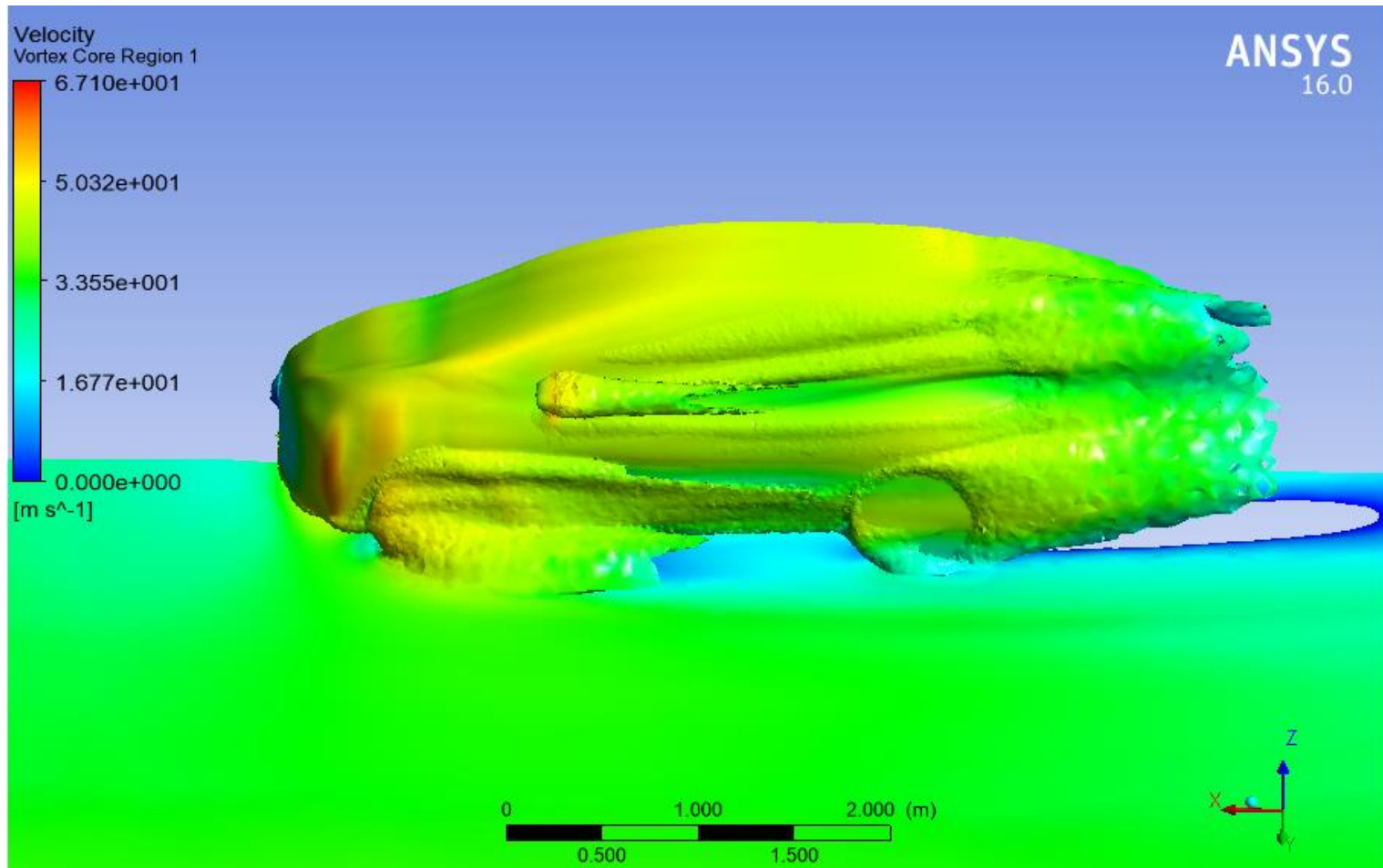
Resultados



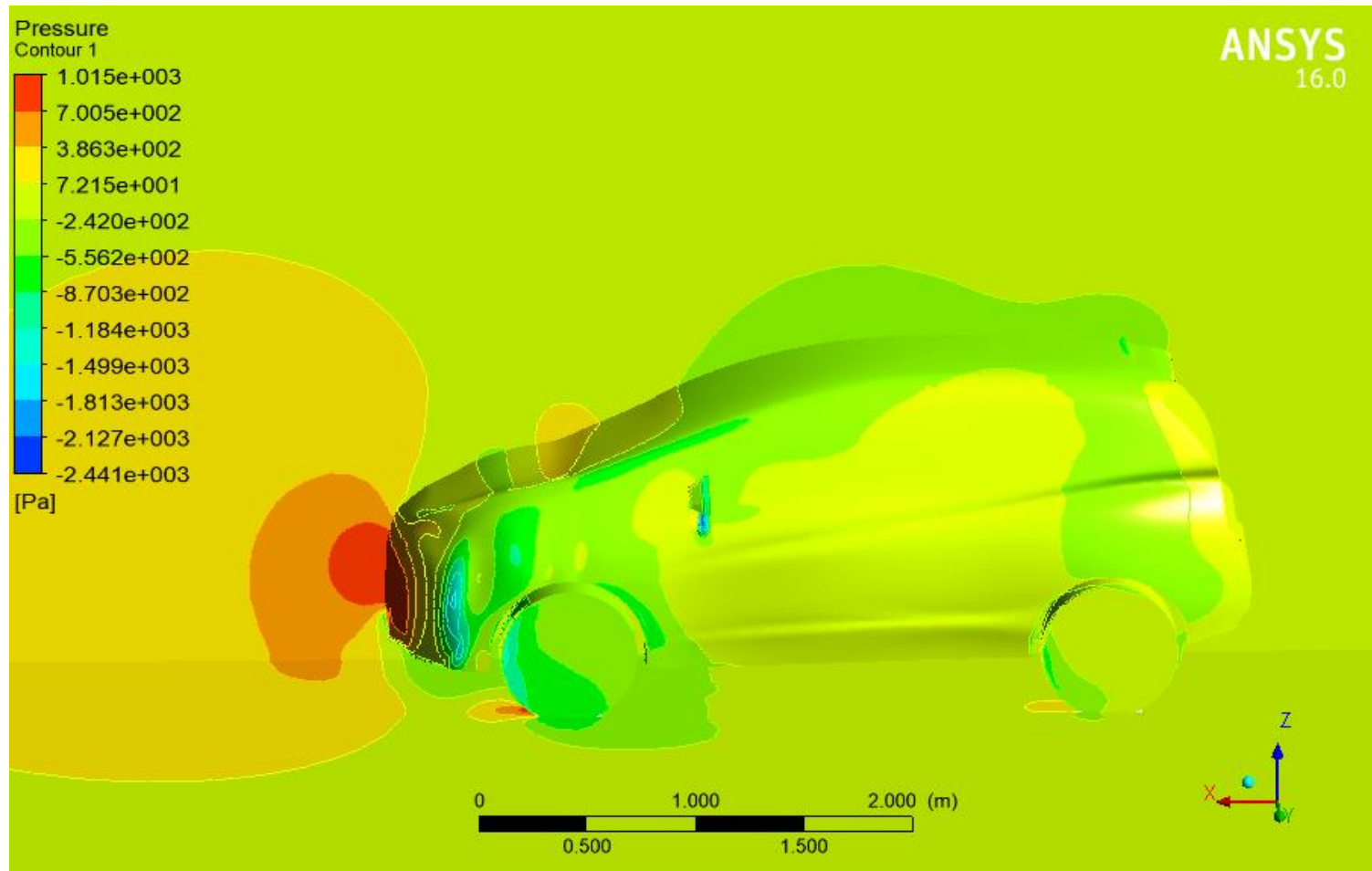
Resultados



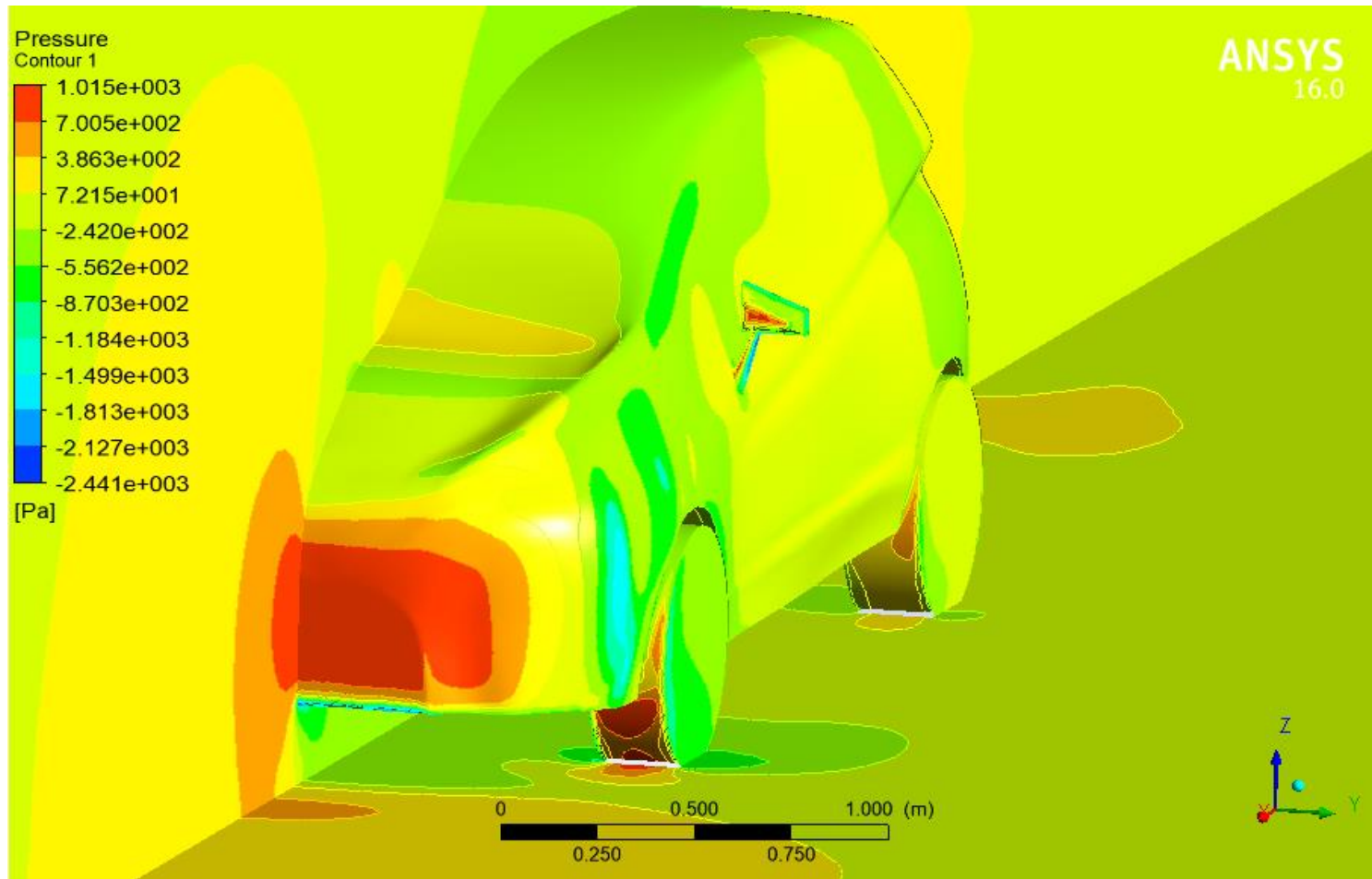
Resultados



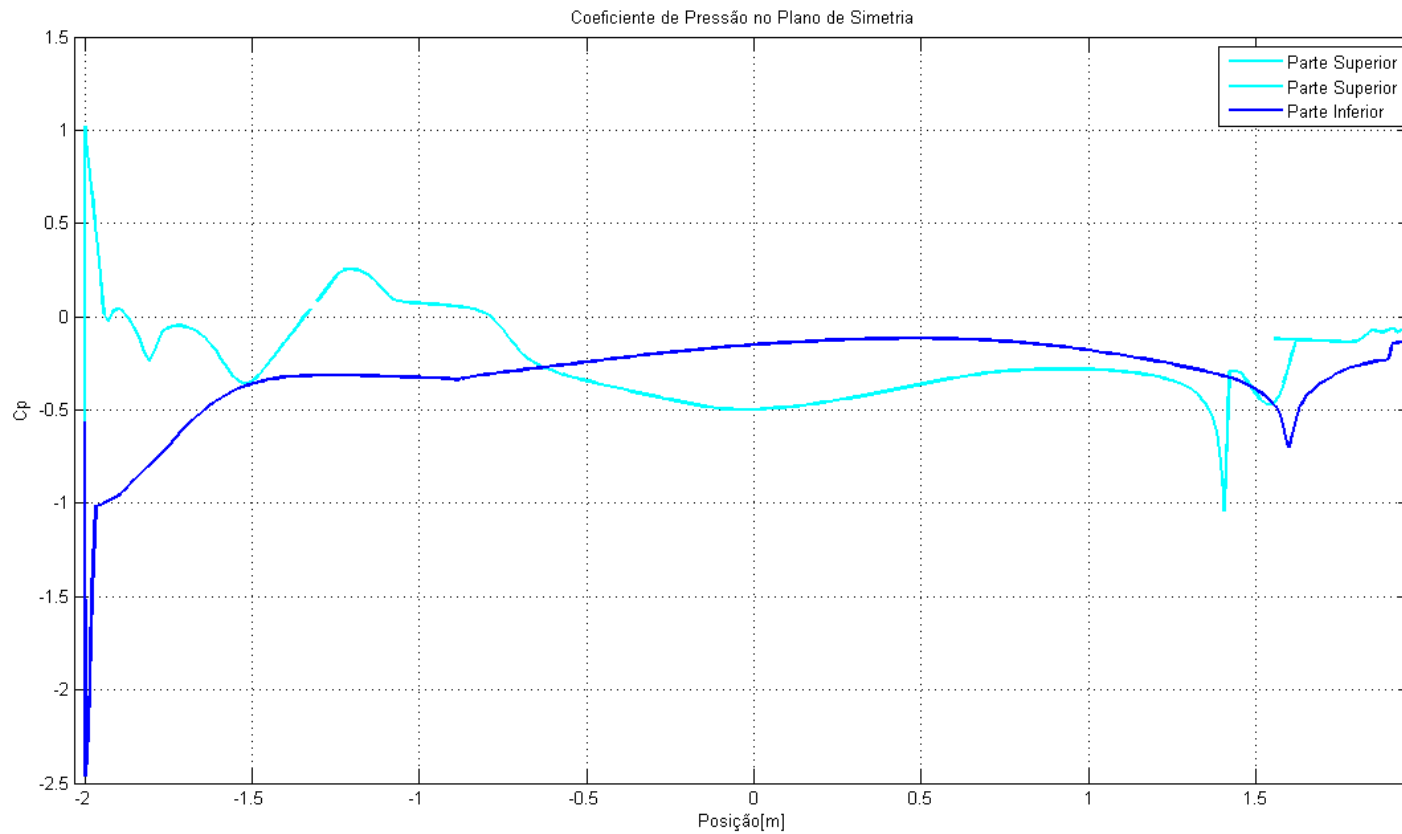
Resultados



Resultados



Resultados



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