

Modelovanie účinkov vetra na budovy a chodcov



Fluid Dynamics

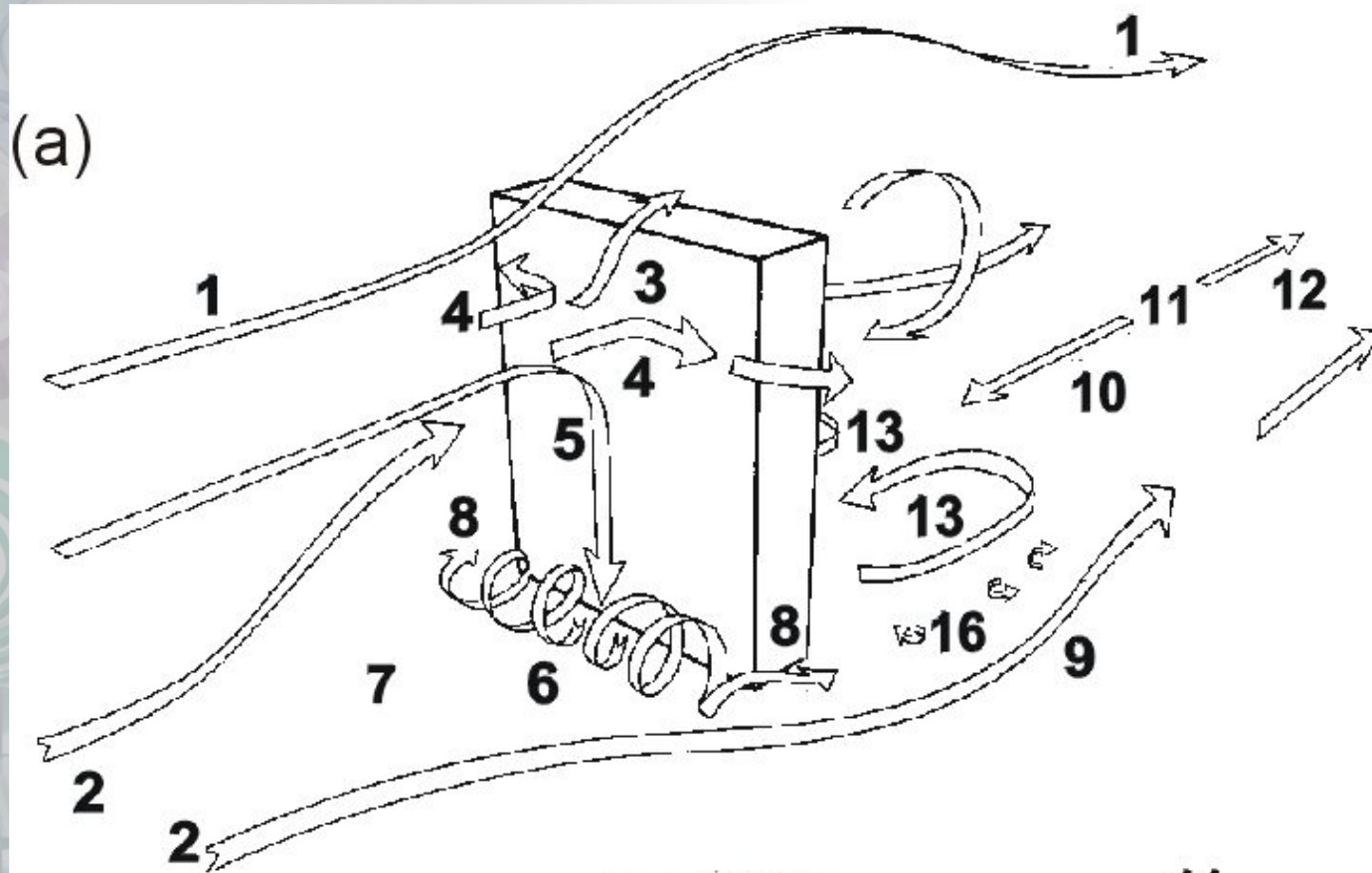
Structural Mechanics

Electromagnetics

Systems and Multiphysics

MAREK MACÁK

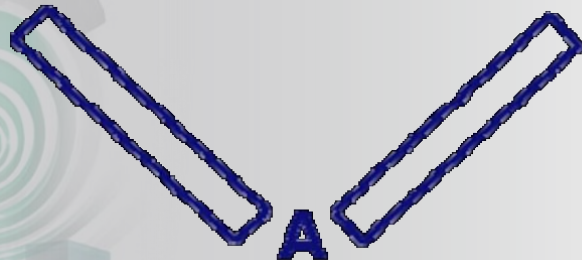
Obraz prúdenia vetra okolo samostatne stojacej budovy



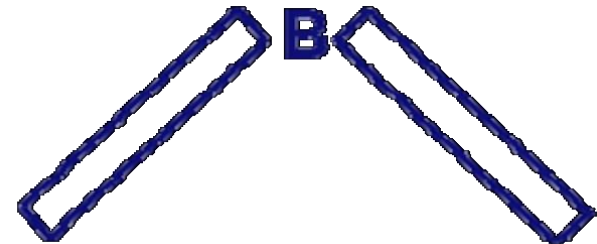


Jednoduchá otázka

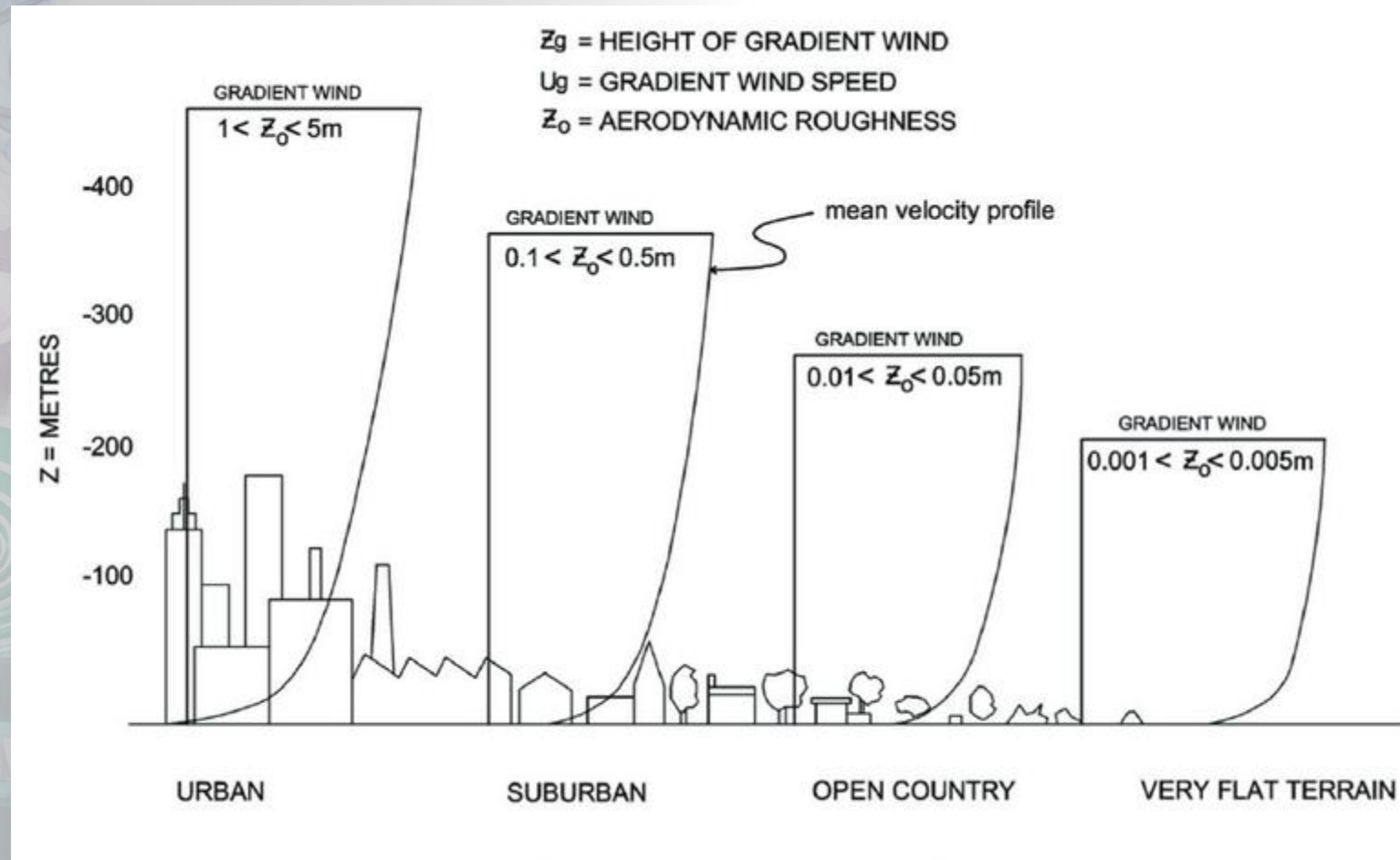
wind



wind



Atmosferická hraničná vrstva

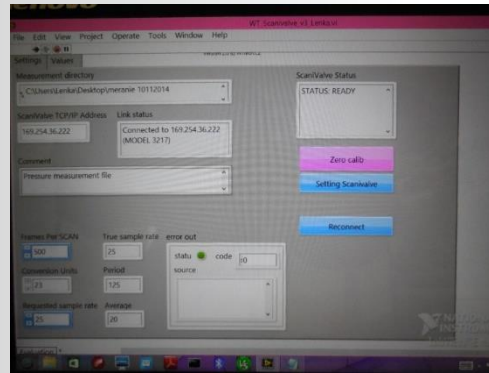
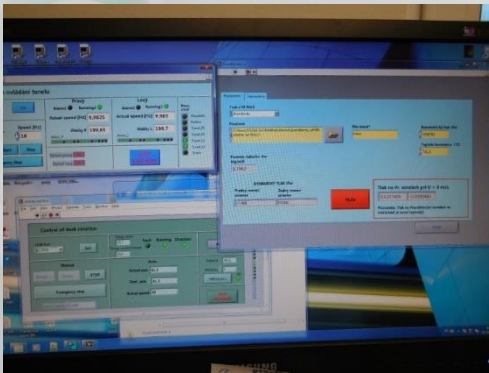


Veterný tunel

- Rozmery: 26.3×2.6×1.6 m (d×v×š)
- Predný merací priestor:
 - laminárne prúdenie
 - rýchlosti vetra od 0.2 m/s do 32 m/s
- Zadný merací priestor:
 - turbulentné prúdenie
 - rýchlosti vetra od 0.3 m/s do 15 m/s
- Terén je modelovaný použitím fólie FASTRADE 20 a bariéry výšky 150mm.

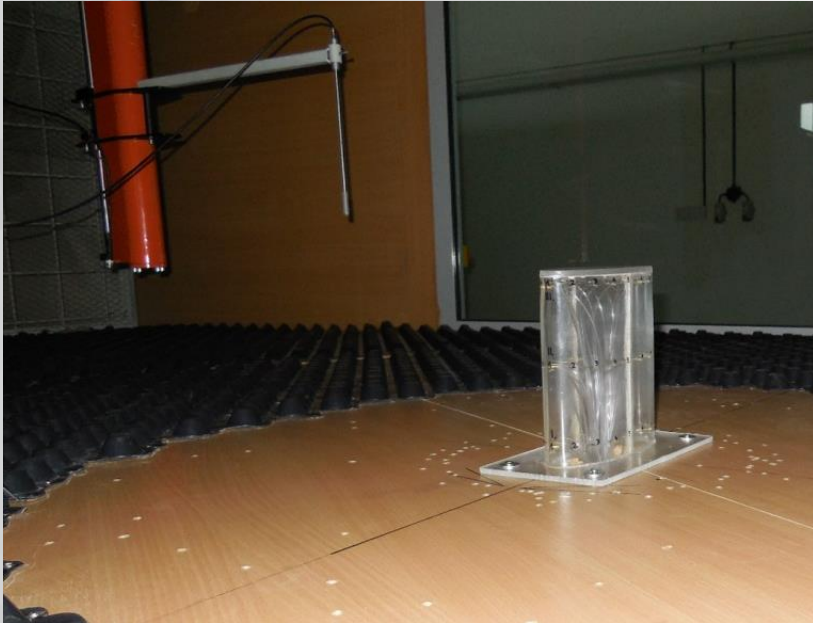


Vybavenie tunela



Modely vo veternom tuneli

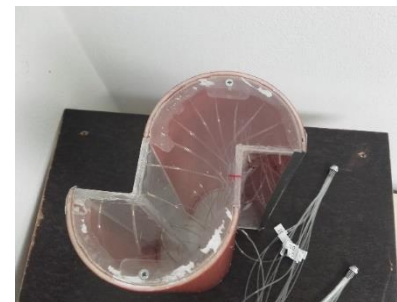
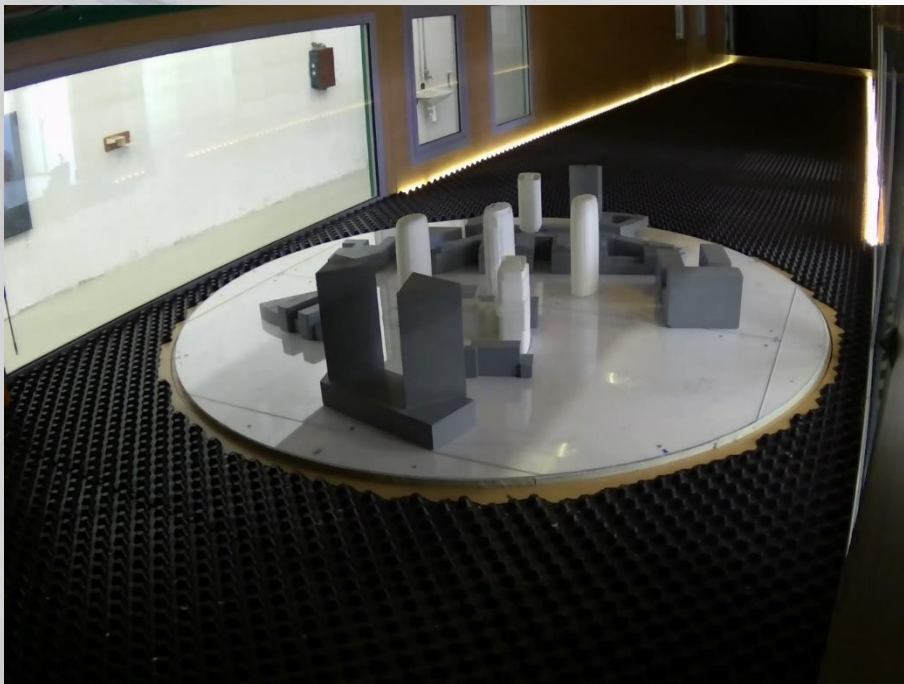
- Experiment vo veternom tuneli



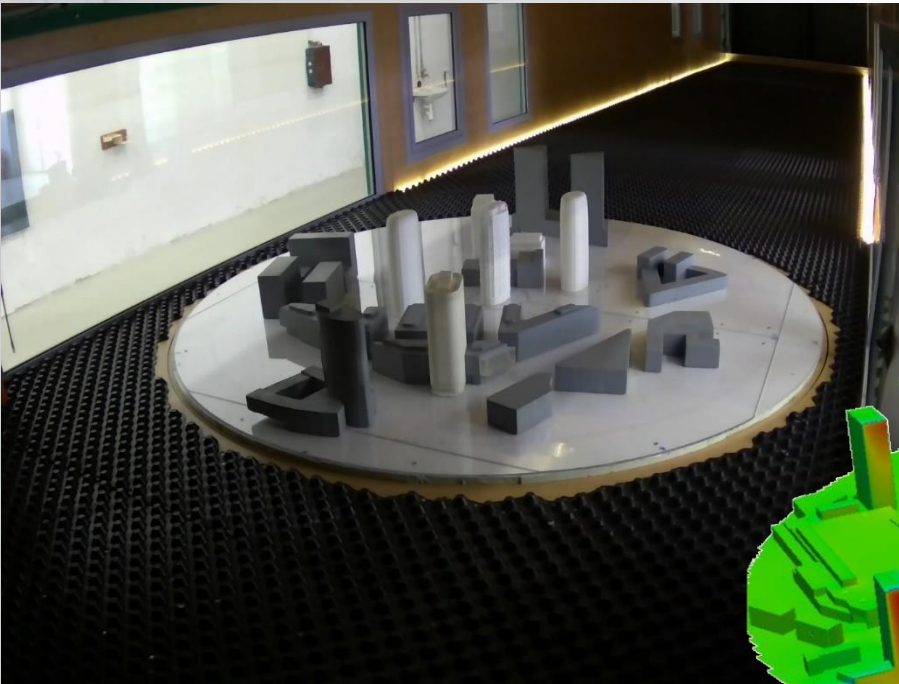
- ▶ Reálna konštrukcia



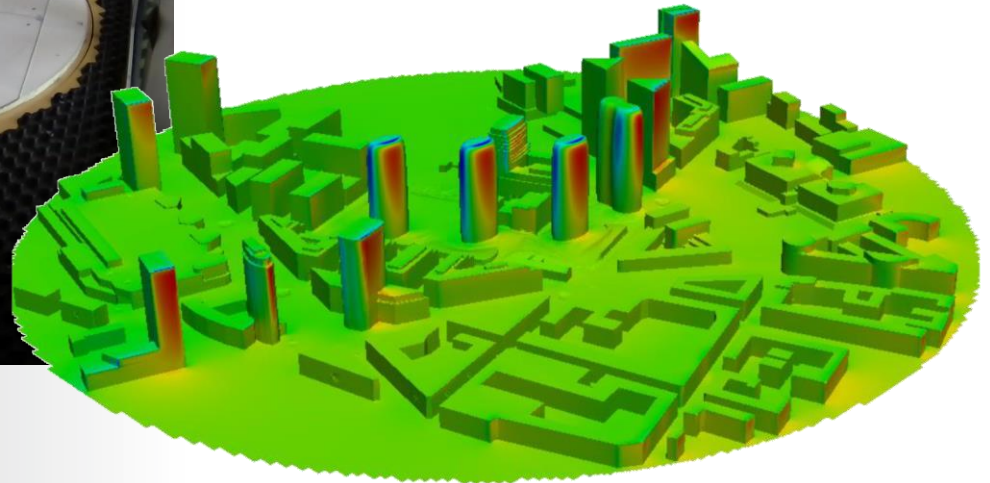
Modely vo veternom tuneli



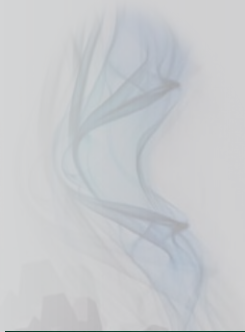
Prečo potrebuje veterný tunel matematiku?



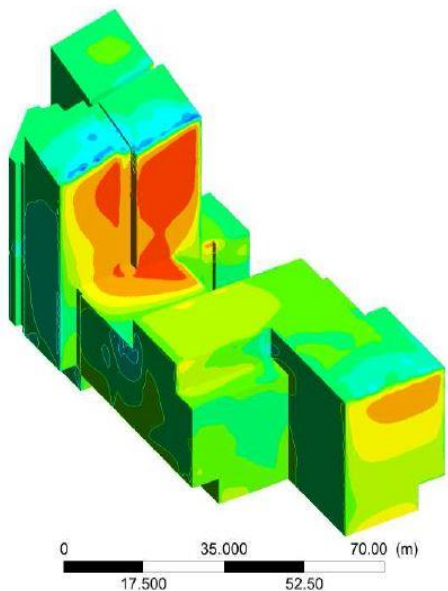
- CFD simulácie
- Spracovanie výsledkov



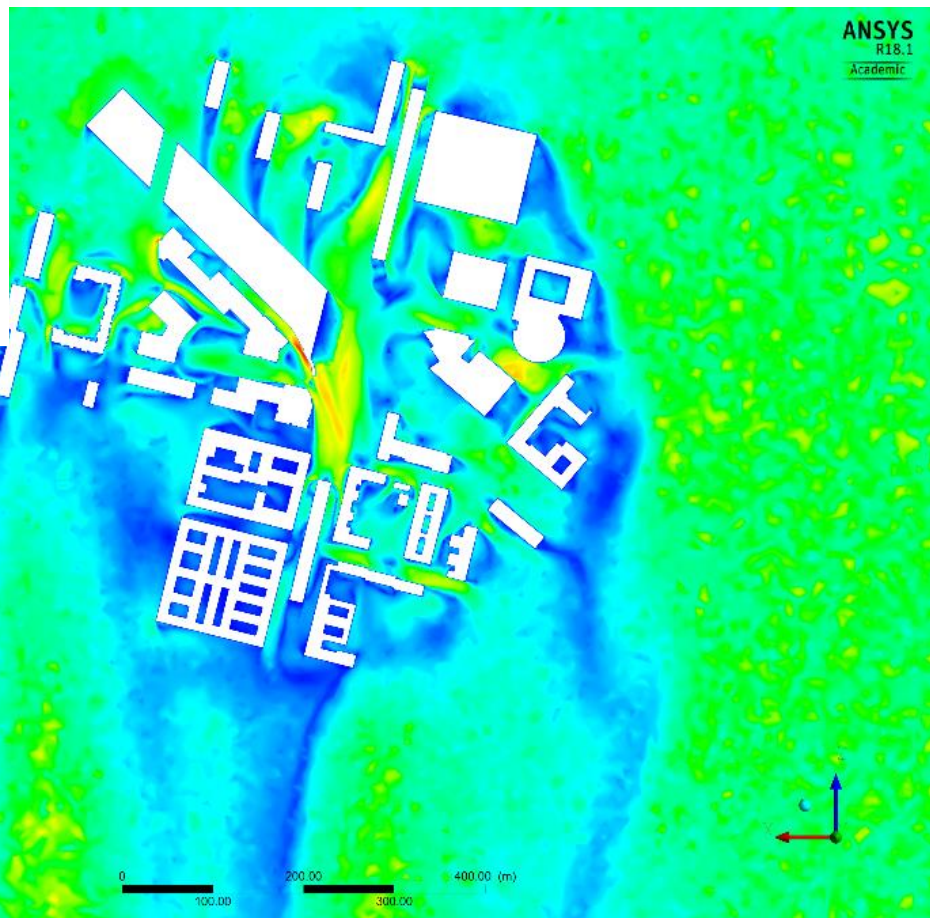
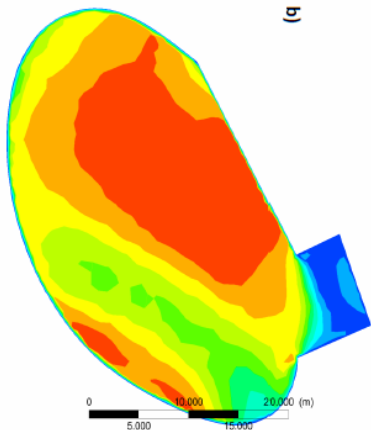
Príklad reálnej spolupráce s praxov



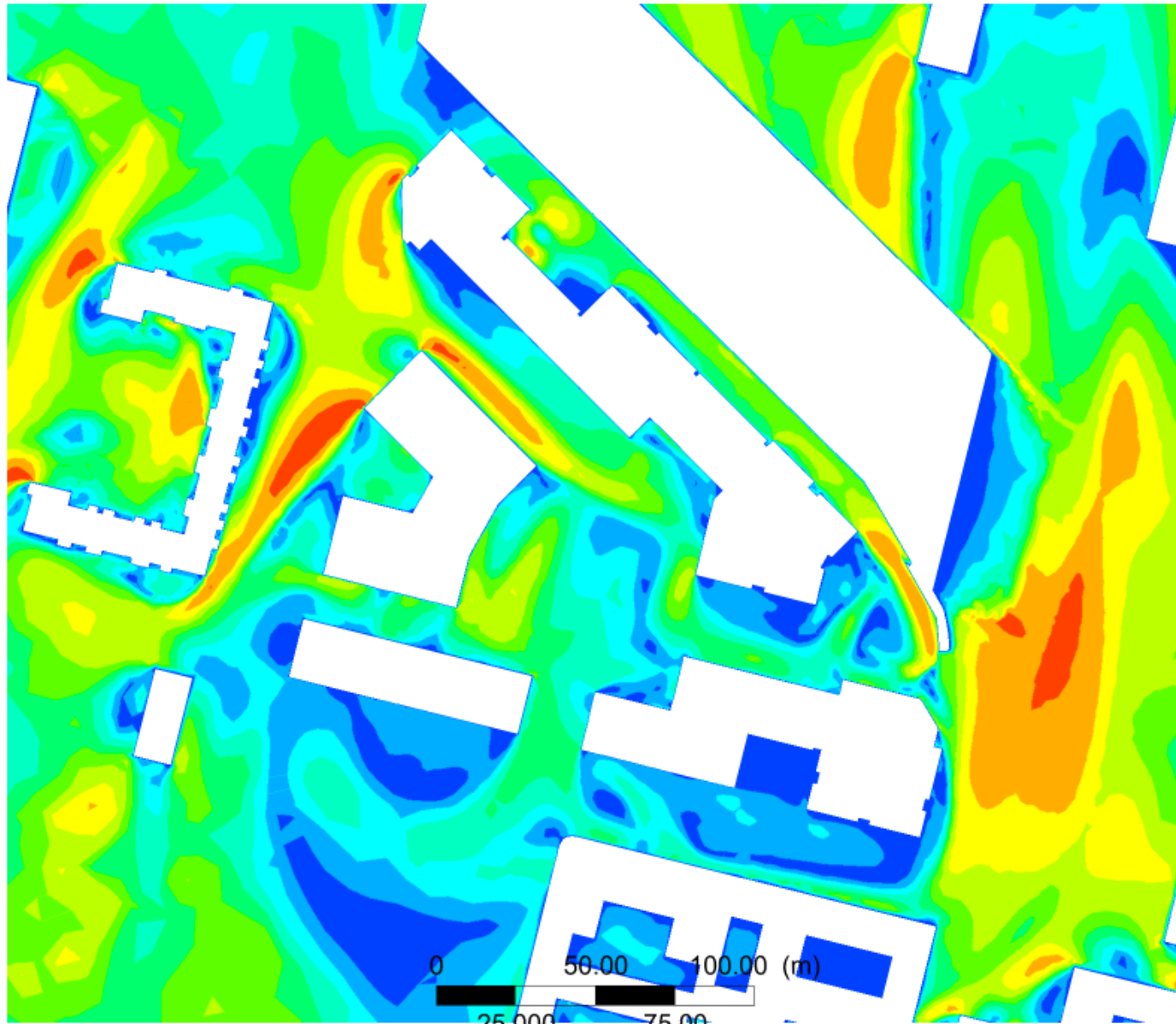
Pressure
1116.760
926.722
736.685
546.648
356.610
166.573
-23.464
-213.502
-403.539
-593.576
-783.613
[Pa]

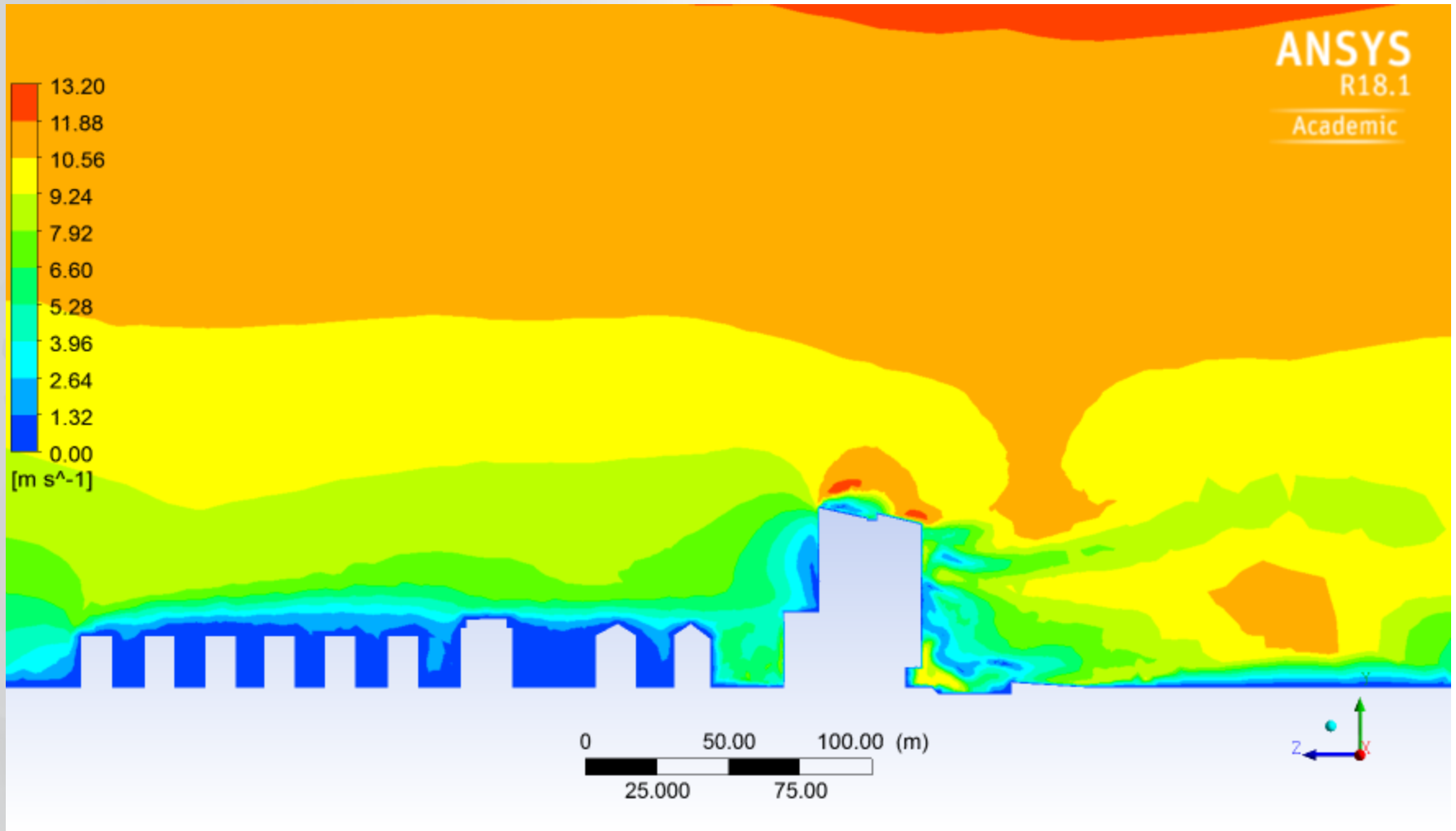


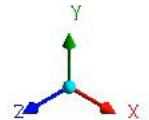
Velocity
6.576
6.279
5.581
4.884
4.186
3.488
2.791
2.093
1.395
0.698
0.000
[m s⁻¹]

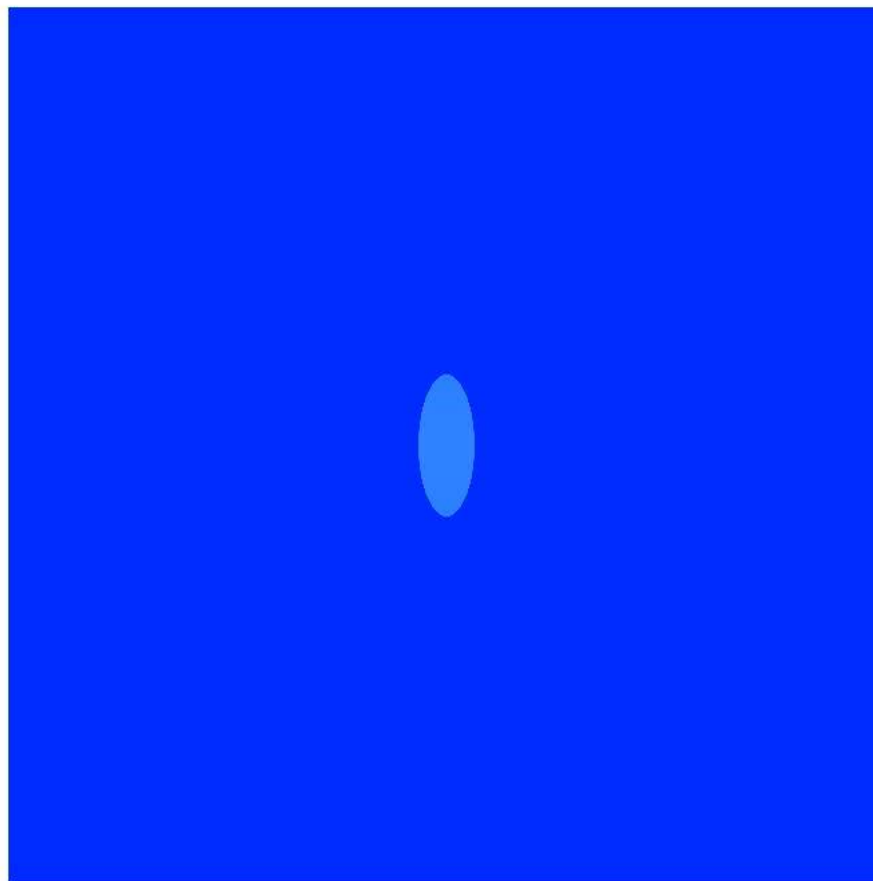


Velocity
6.542
5.888
5.234
4.580
3.925
3.271
2.617
1.963
1.308
0.654
0.000
[m s⁻¹]



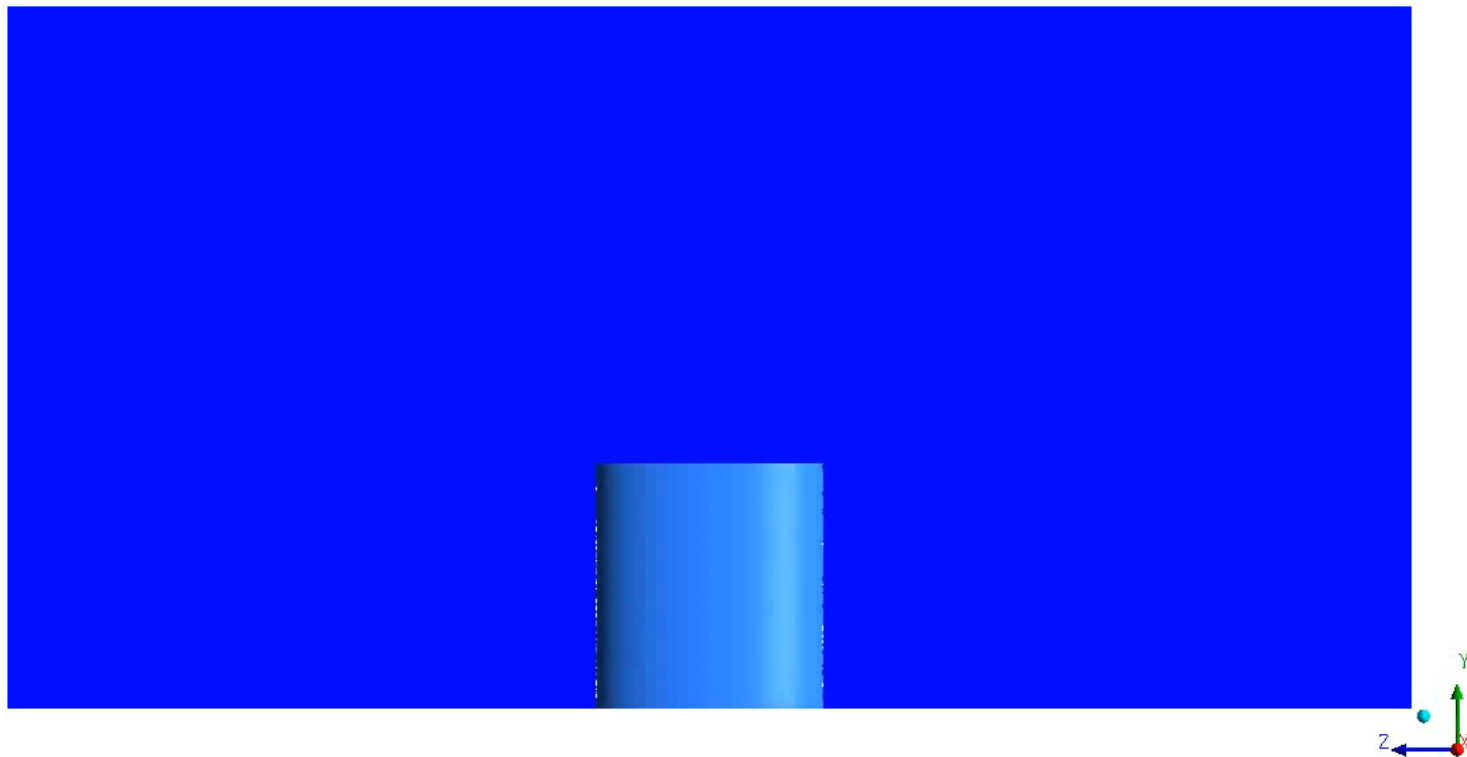




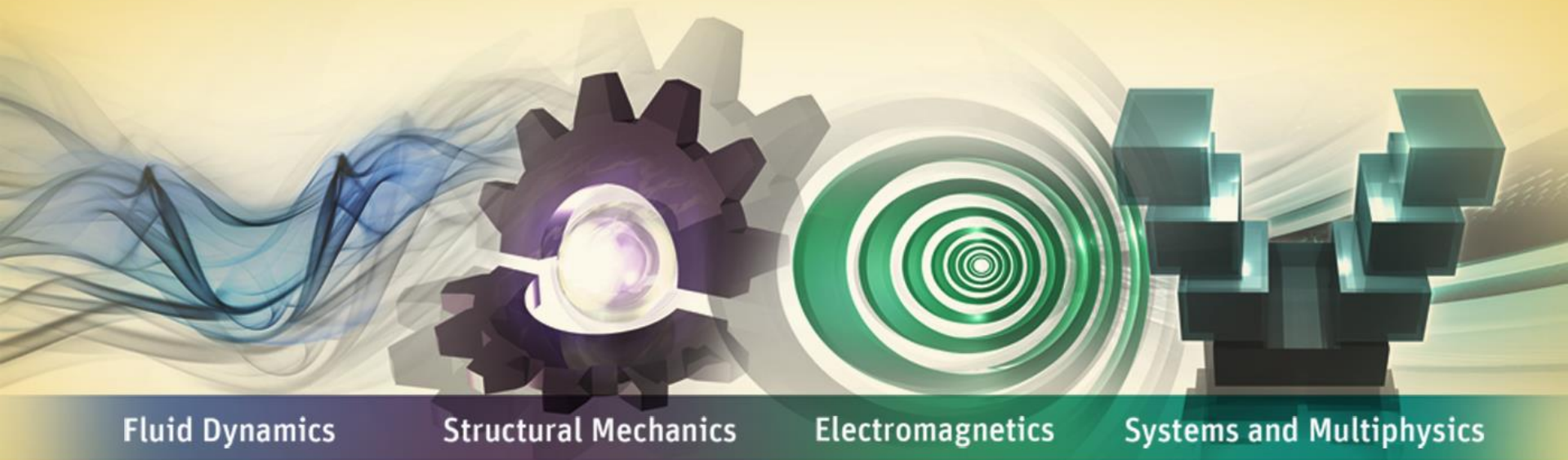


Výsledky

ANSYS
R17.0



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Fluid Dynamics

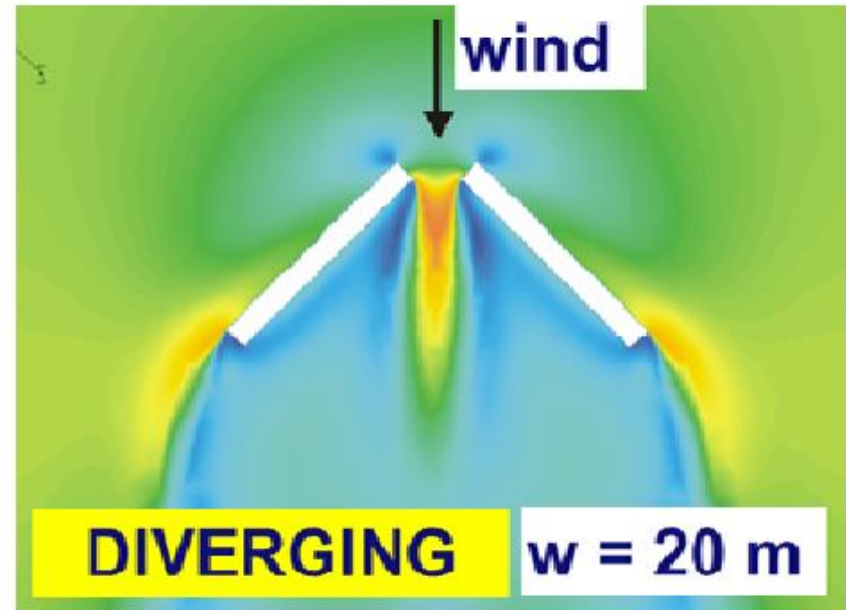
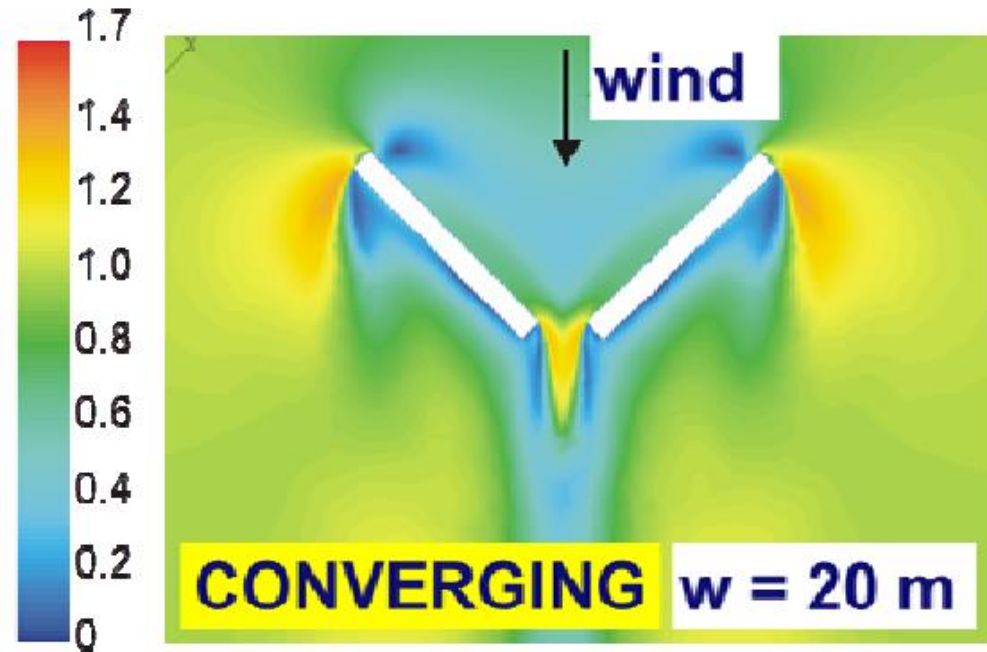
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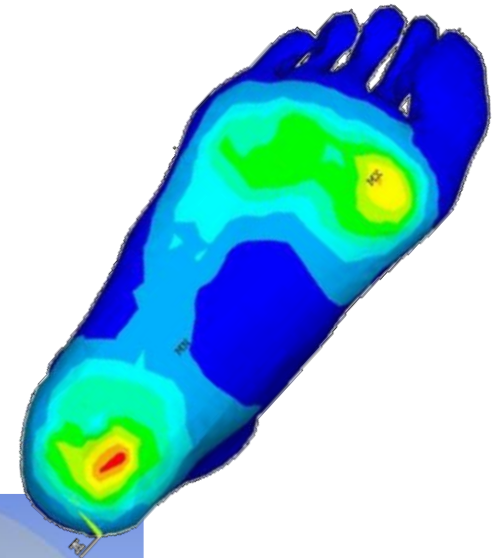
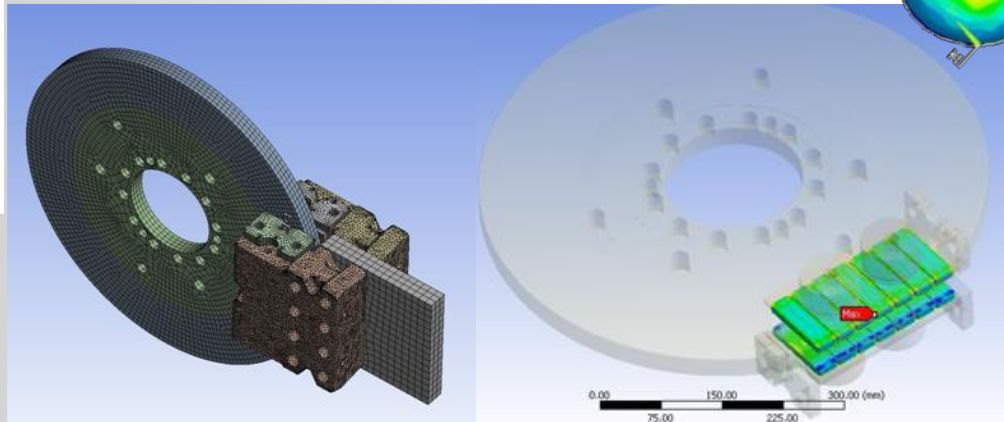
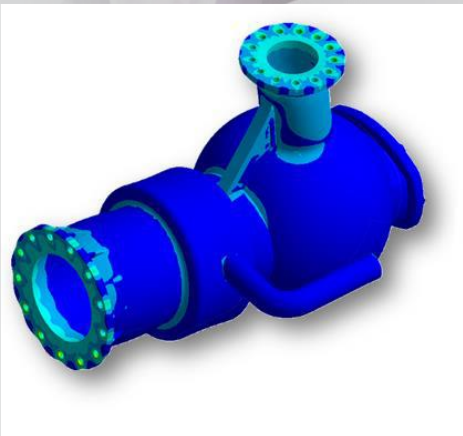
Systems and Multiphysics

MAREK MACÁK

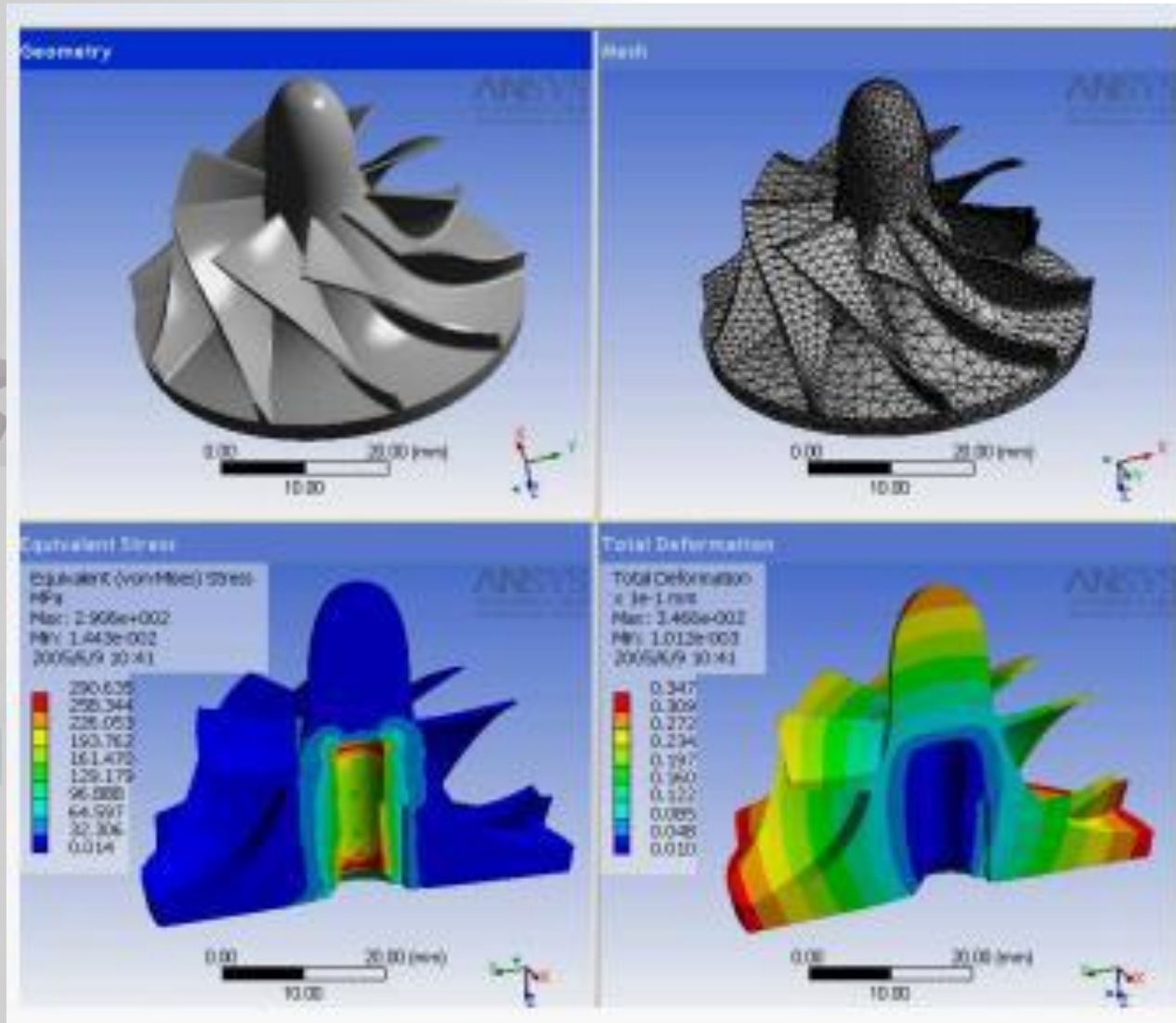
Charakteristika

- Numerická analýza je spôsob ako nájsť odozvu prvku na podmienky
- Rovnica ktorá rieši statickú analýzu

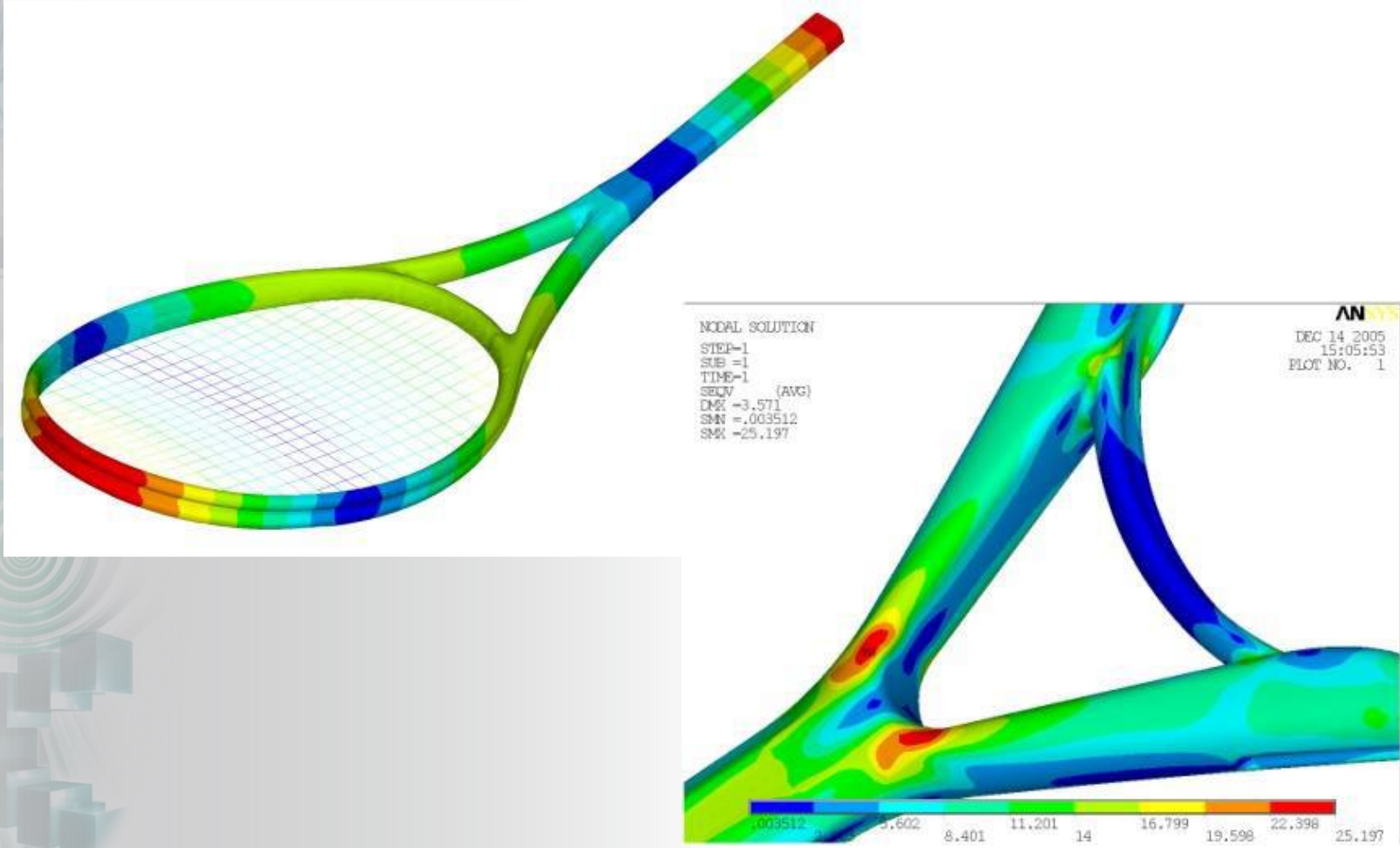
$$[K]\{u\} = \{f\}$$



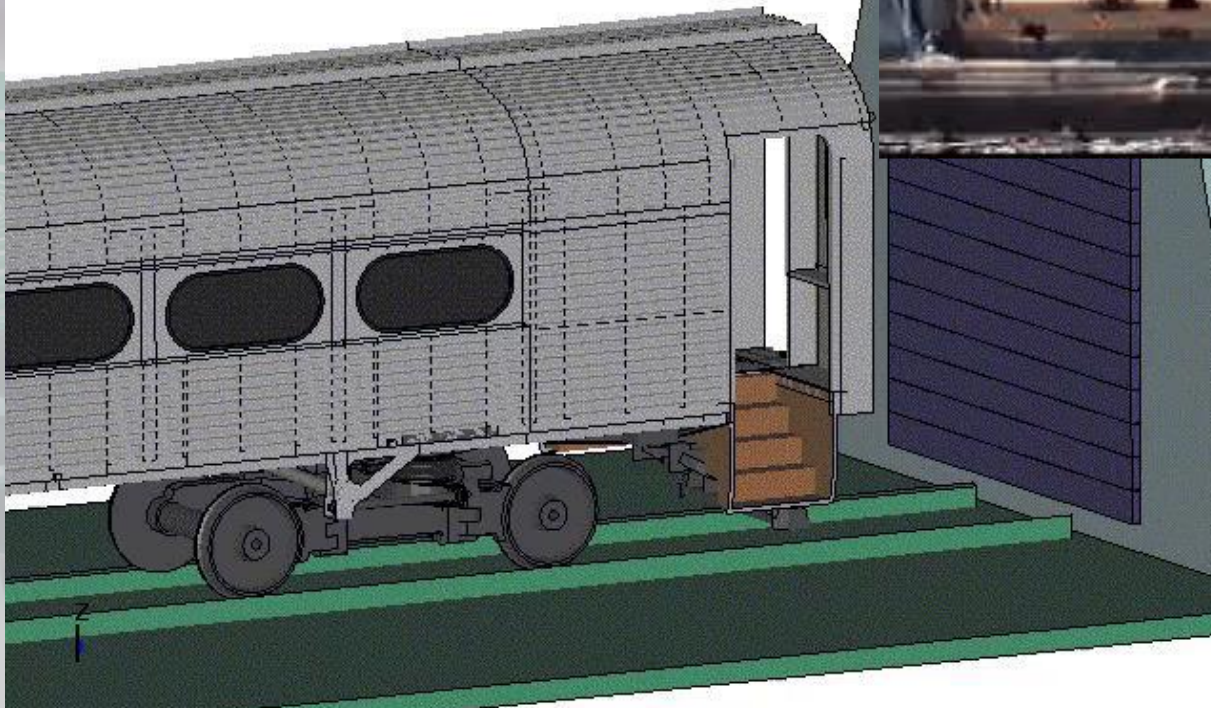
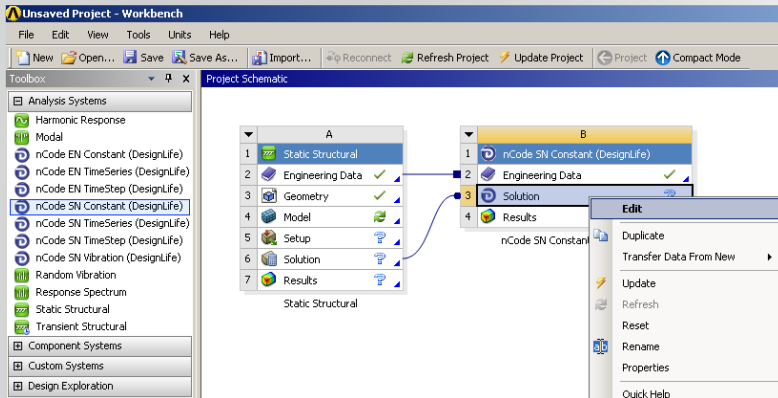
Numerické simulácie



Numerické simulácie



Numerické simulácie



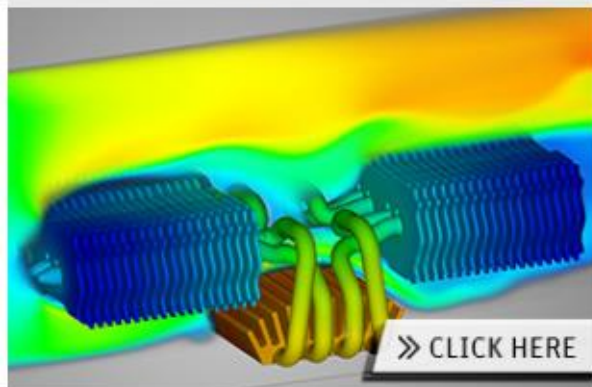
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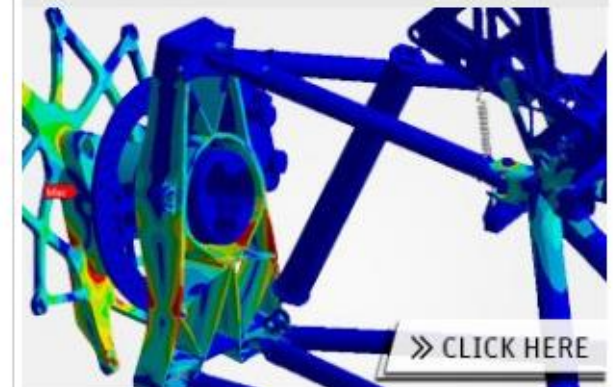
Discovery Live Student



ANSYS AIM Student



ANSYS Student

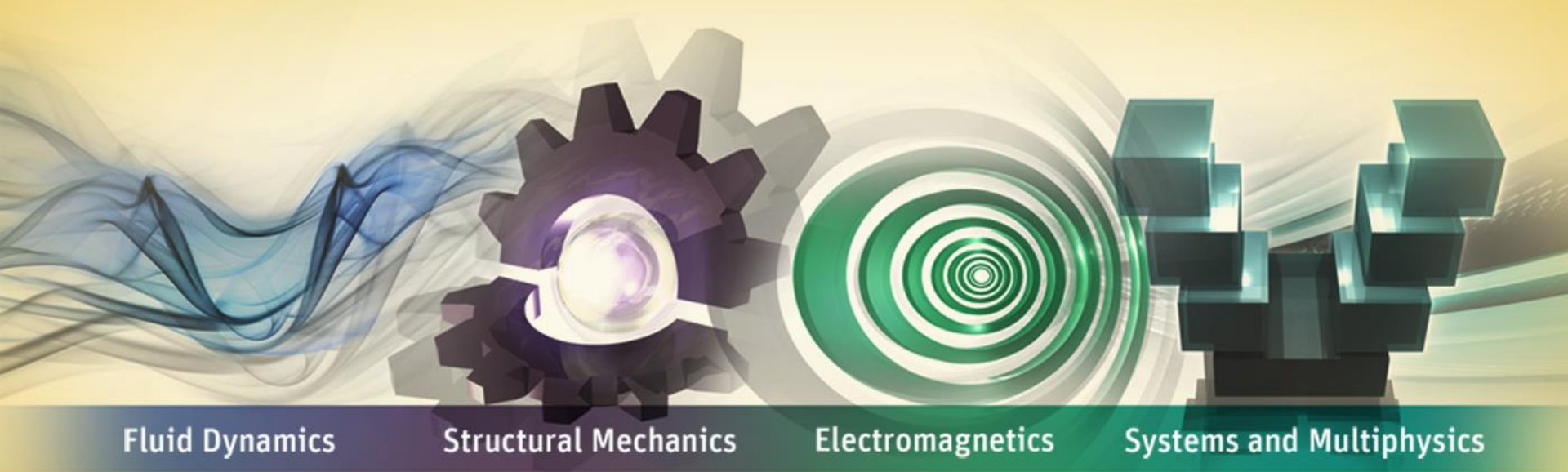


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