COMSOL CONFERENCE
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Air Flow Conditions for Flutter Energy Conversion Device

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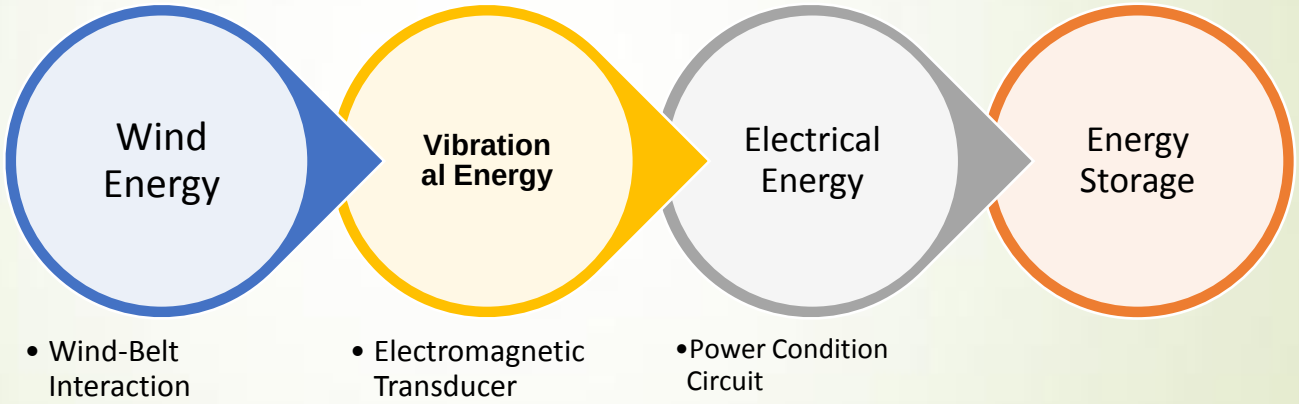
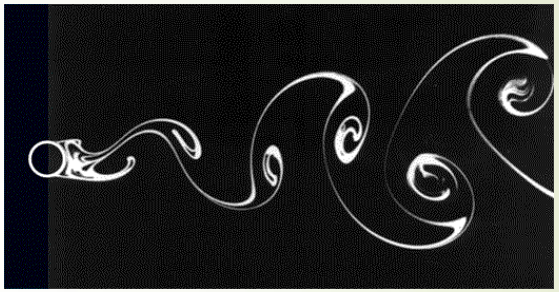
Introduction

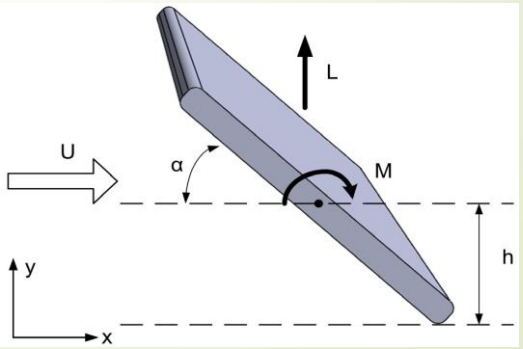


Introduction

- Fluid flow
- Obstacle in fluid flow
- Karman vortex

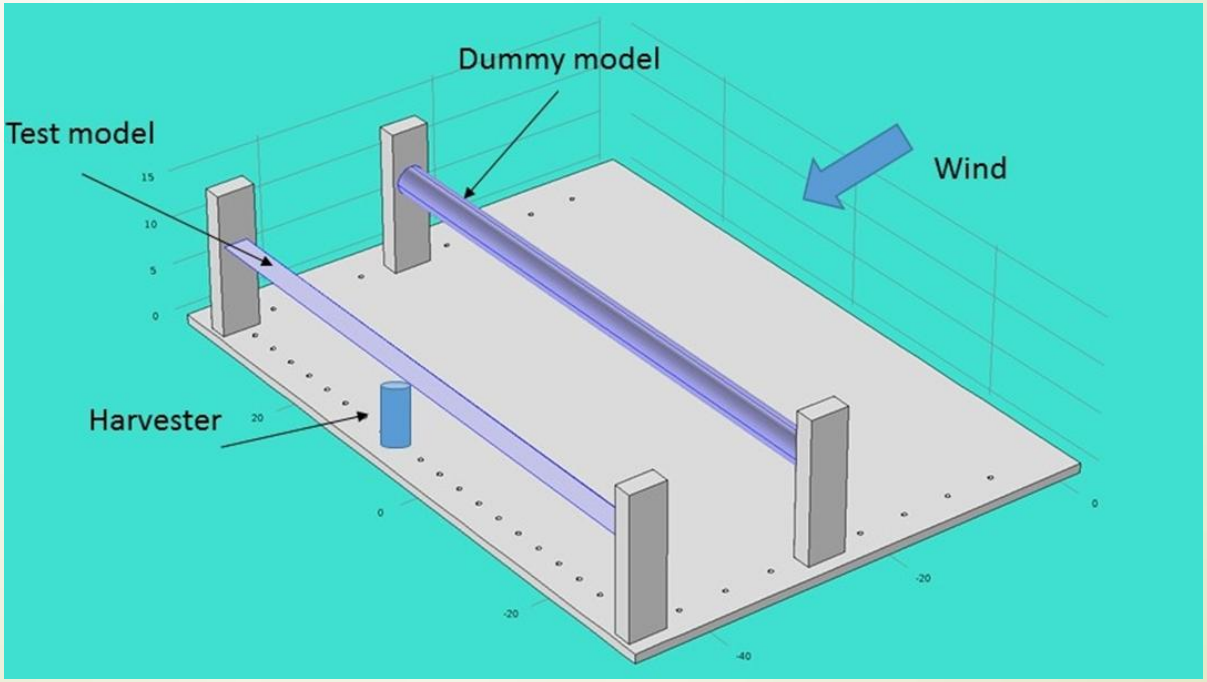


- *Aerodynamic Flutter Instability*

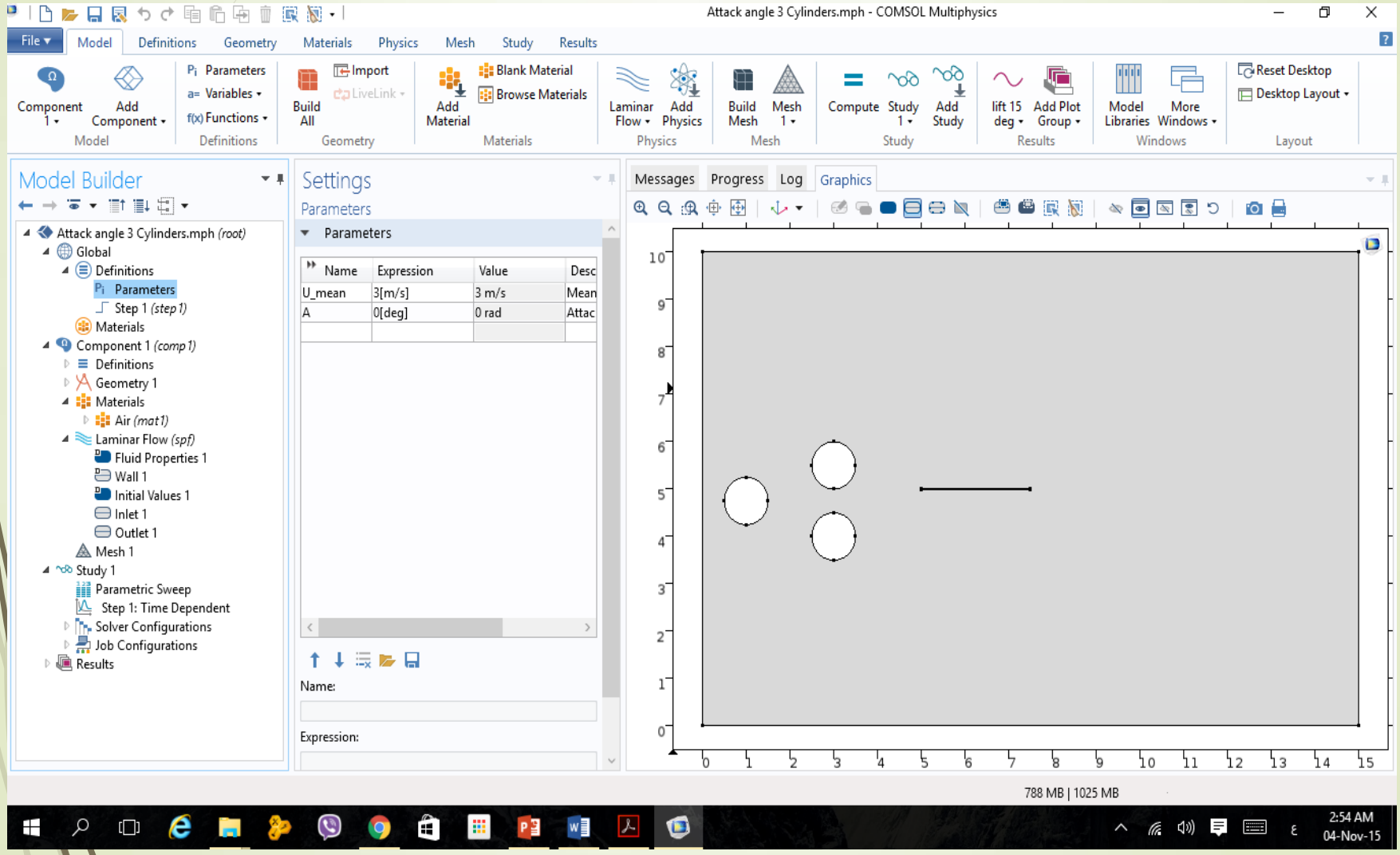


Model description

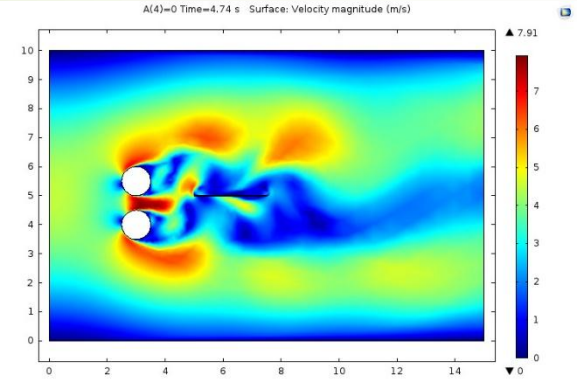
- Flutter Energy Conversion Device (FECD)

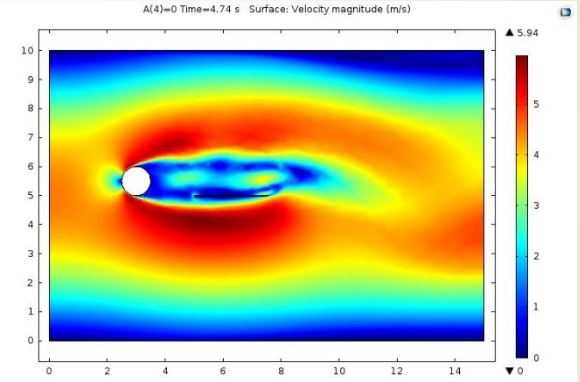


Simulation


Attack angle 3 Cylinders.mph - COMSOL Multiphysics
File
Model
Definitions
Geometry
Materials
Physics
Mesh
Study
Results
Component 1
Add Component
Parameters
Variables
Functions
Build All
Import
LiveLink
Add Material
Blank Material
Browse Materials
Laminar Flow
Add Physics
Build Mesh
Mesh 1
Compute
Study 1
Add Study
lift 15 deg
Add Plot Group
Model Libraries
More Windows
Reset Desktop
Desktop Layout
Model
Definitions
Geometry
Materials
Physics
Mesh
Study
Results
Windows
Layout
Model Builder
Attack angle 3 Cylinders.mph (root)
Global
Definitions
Parameters
Step 1 (step 1)
Materials
Component 1 (comp 1)
Definitions
Geometry 1
Materials
Air (mat1)
Laminar Flow (spf)
Fluid Properties 1
Wall 1
Initial Values 1
Inlet 1
Outlet 1
Mesh 1
Study 1
Parametric Sweep
Step 1: Time Dependent
Solver Configurations
Job Configurations
Results
Settings
Parameters
Parameters
Name
Expression
Value
Desc
U_mean
3[m/s]
3 m/s
Mean
A
0[deg]
0 rad
Attac
Name:
Expression:
Messages
Progress
Log
Graphics
788 MB | 1025 MB
2:54 AM
04-Nov-15

Results


A(4)=0 Time=4.74 s Surface: Velocity magnitude (m/s)
▲ 7.91
▼ 0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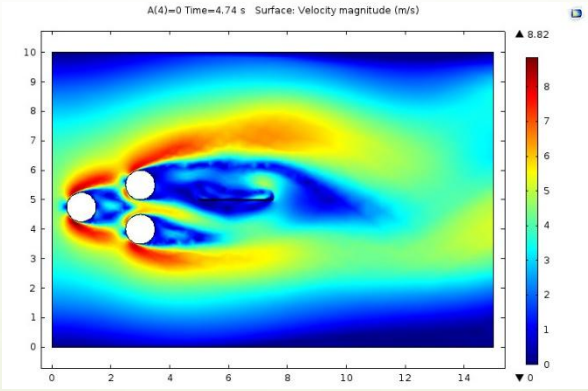
▲ 5.94
▼ 0


A(4)=0 Time=4.74 s Surface: Velocity magnitude (m/s)
▲ 8.82
▼ 0

Results

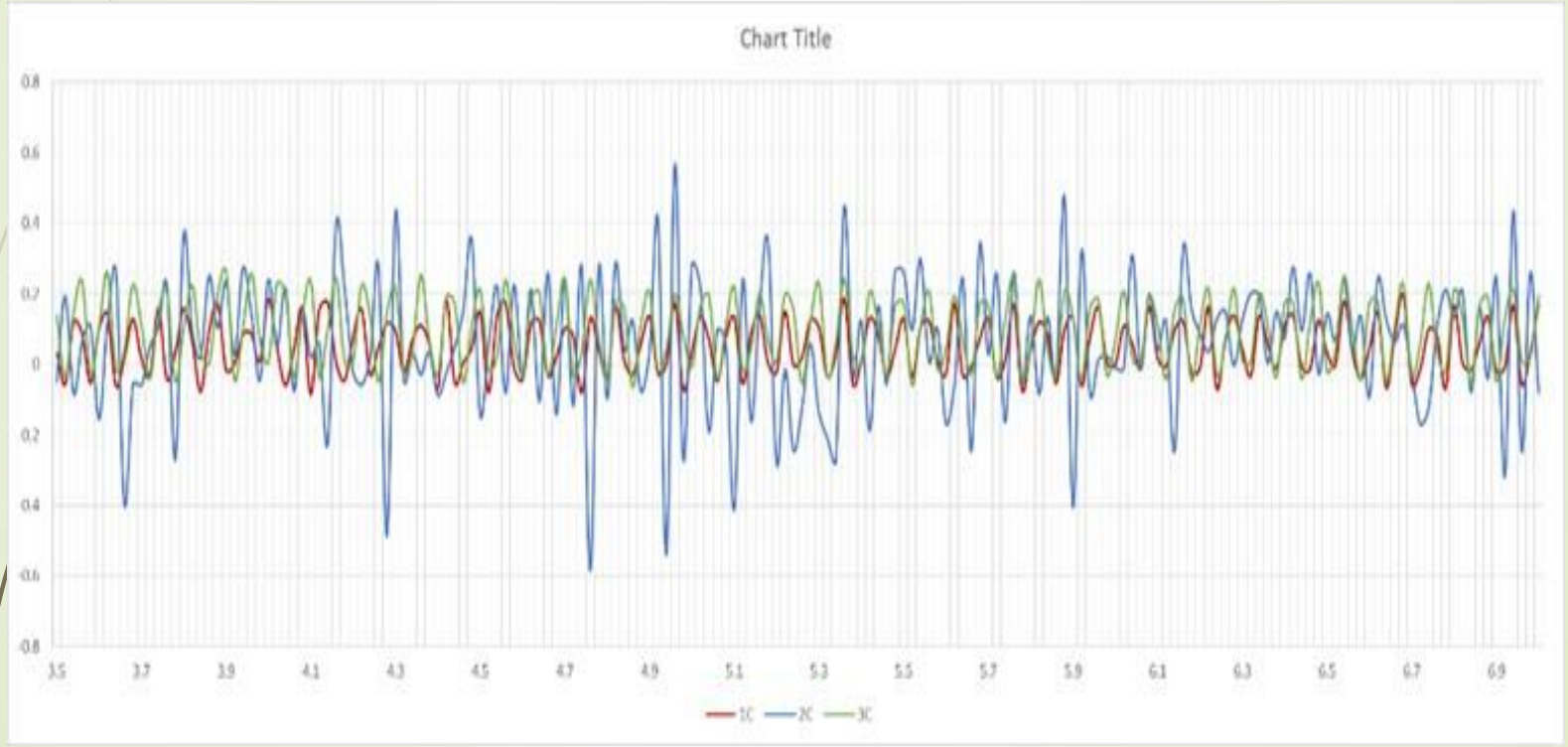


Chart Title
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
3.5
3.7
3.9
4.1
4.3
4.5
4.7
4.9
5.1
5.3
5.5
5.7
5.9
6.1
6.3
6.5
6.7
6.9

Conclusion

- Introduced an aerodynamic flutter-based energy conversion device driven by the airflow in an indoor ventilation duct.
- Two cylinders have a higher fluctuation of lift force than one or three cylinders

References

- **References**
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