



Rotors in Complex Inflow, AVATAR, WP2

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Rotors in Complex Inflow, AVATAR, WP2

30-11-2017

Wind Europe, Amsterdam

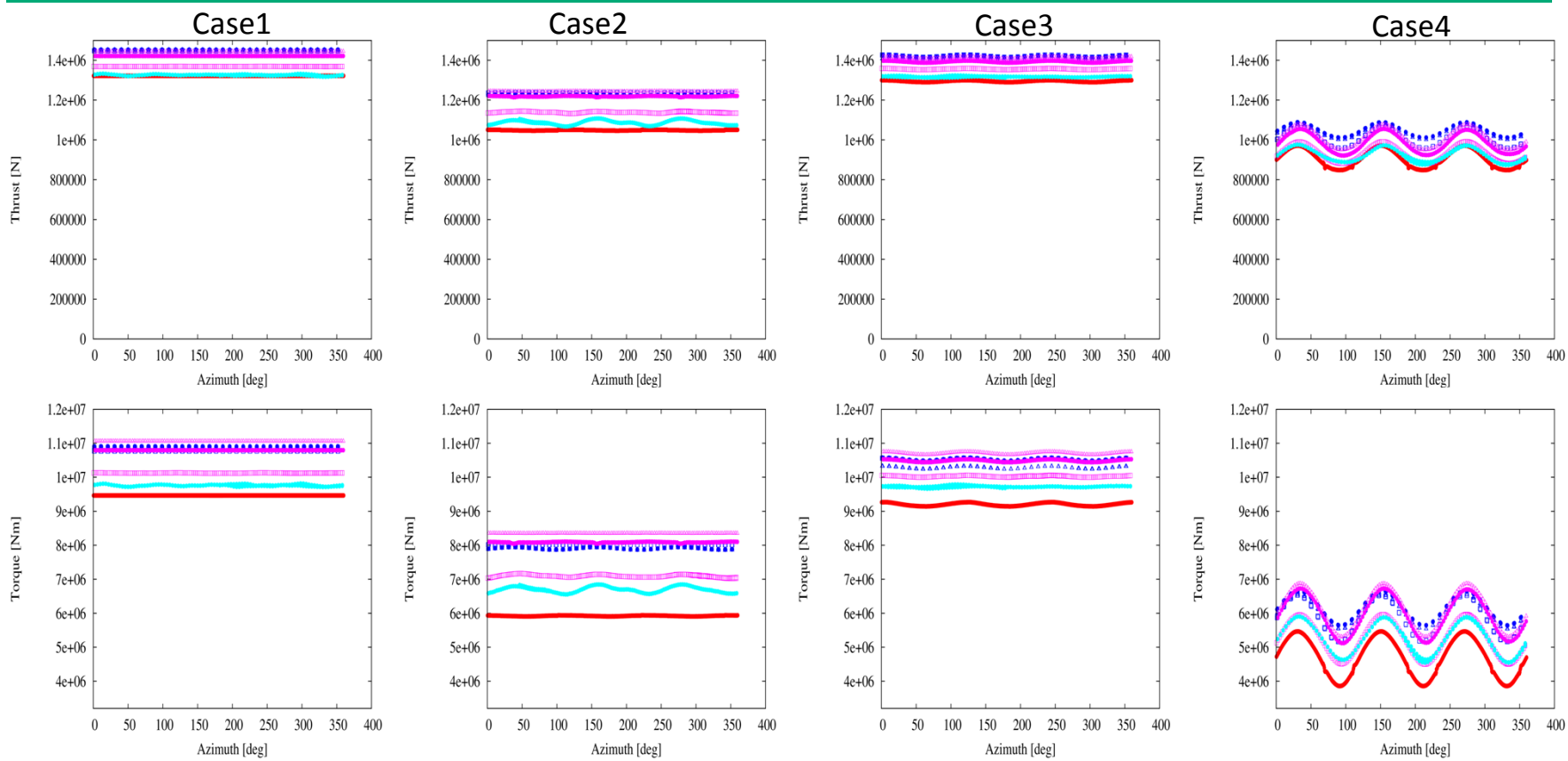
This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grand agreement No FP7-ENERGY-2013-1/n° 608396 .

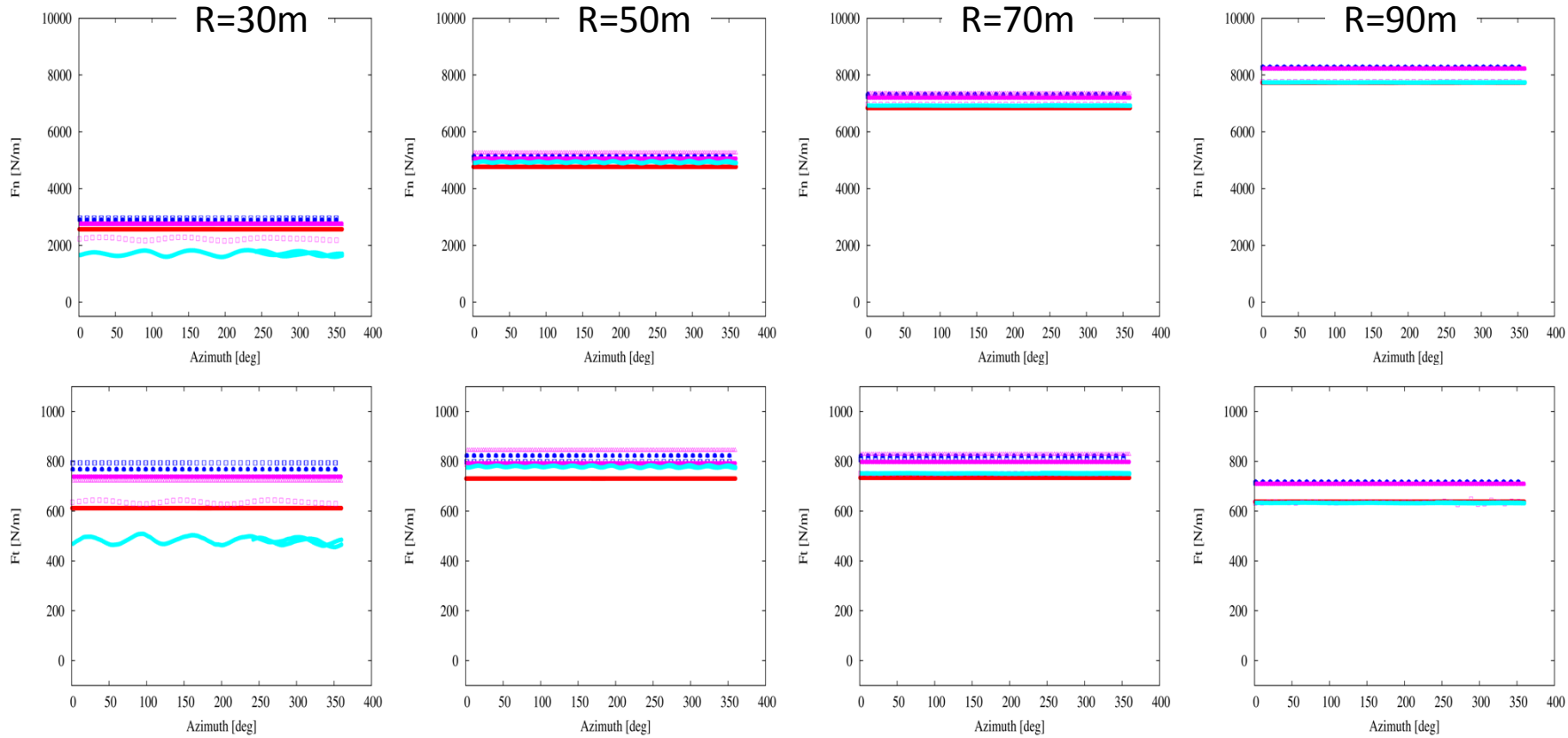


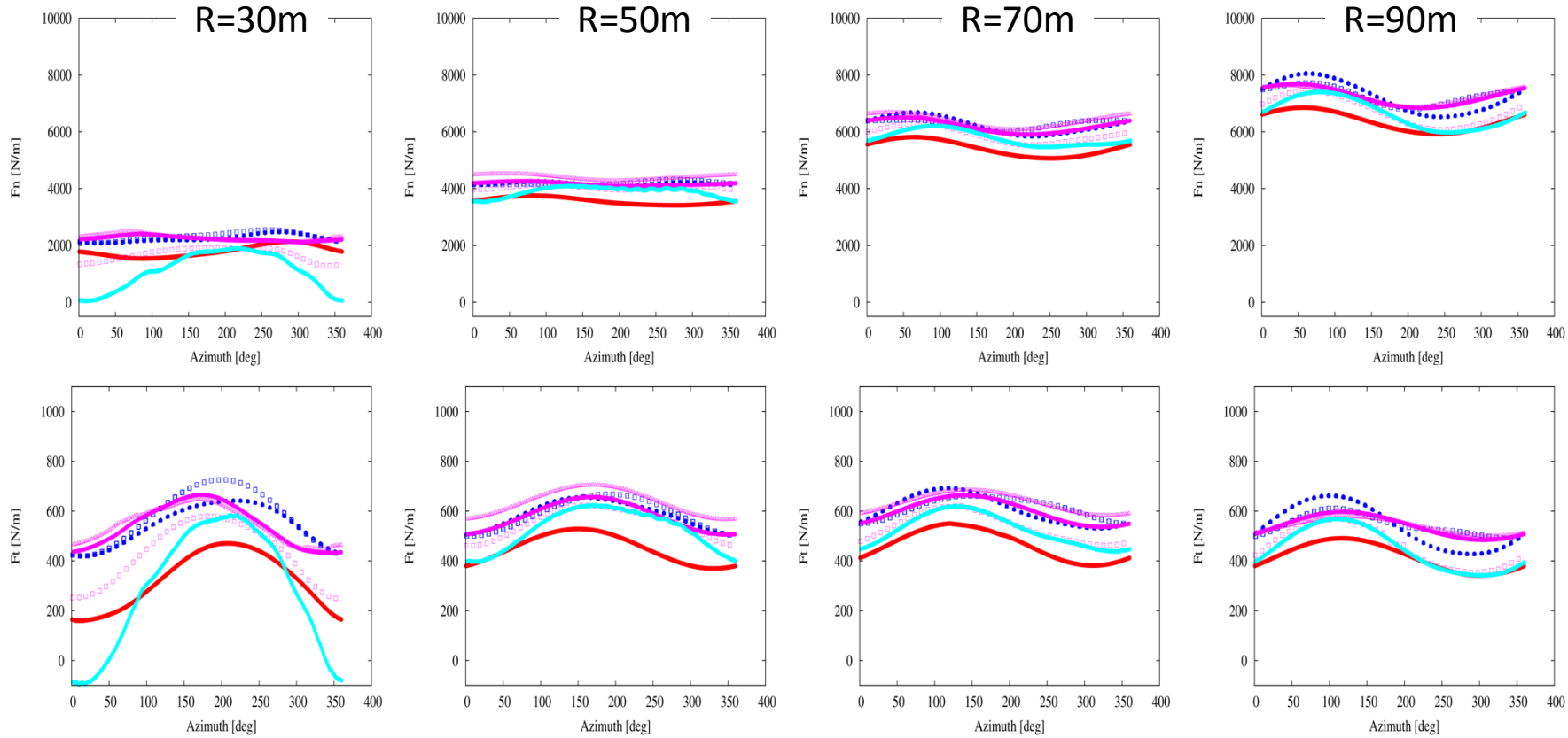
Setting/CASE	1	2	3	4	9
Tip Pitch [degrees]	0	0	0	0	0
Temperature [Celsius]	15	15	15	15	15
Pressure [hPa]	1013	1013	1013	1013	1013
Density [kg/m ³]	1.225	1.225	1.225	1.225	1.225
Viscosity [10 ⁻⁵ kg/ms]	1.7879	1.7879	1.7879	1.7879	1.7879
Wind Speed [m/s]	10.5	10.5	10.5	10.5	10.5
RPM	9.02	9.02	9.02	9.02	9.02
Yaw angle [degrees]	0.0	30	0.0	0.0	0.0
Shear Exponent	0.0	0.2	0.0	0.0	0.0
Wake Situation	None	None	None	Half Wake	None
Hub Height [m]	132.7	132.7	132.7	132.7	132.7

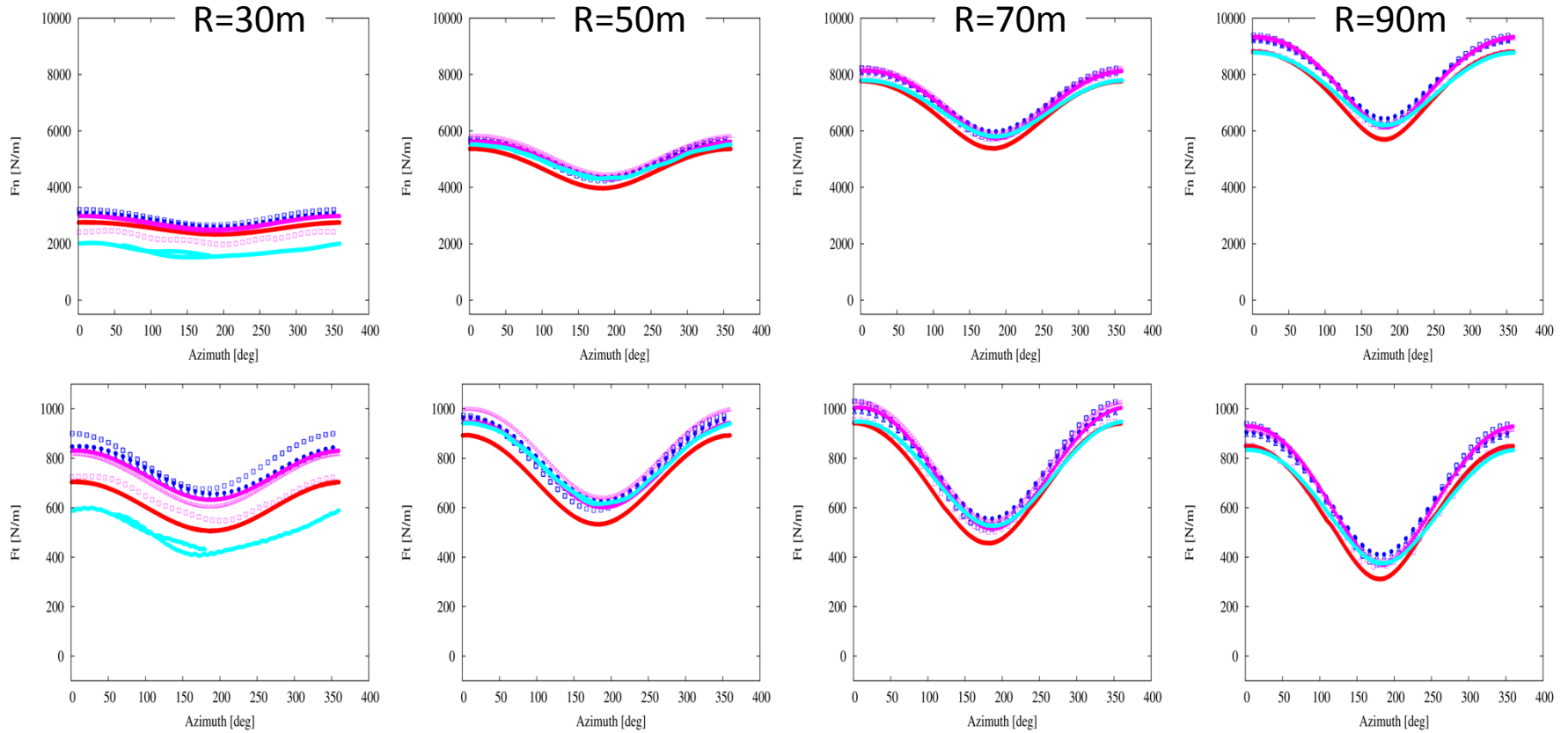
-
- To test the dynamic inflow models a dynamic pitch step were added (Case-9)
 - The case is based on Case-1
 - For $T < 90$ sec. run at original conditions
 - At $T = 90$ sec. the turbine is pitched 2 degrees towards low AOA.
 - At $T = 130$ sec. the turbine is pitched 2 degrees toward higher AOA.
 - At $T = 170$ sec. the turbine is pitched 2 degrees toward higher AOA.
 - To accommodate the CFD solvers the pitch is smoothed using a tanh function

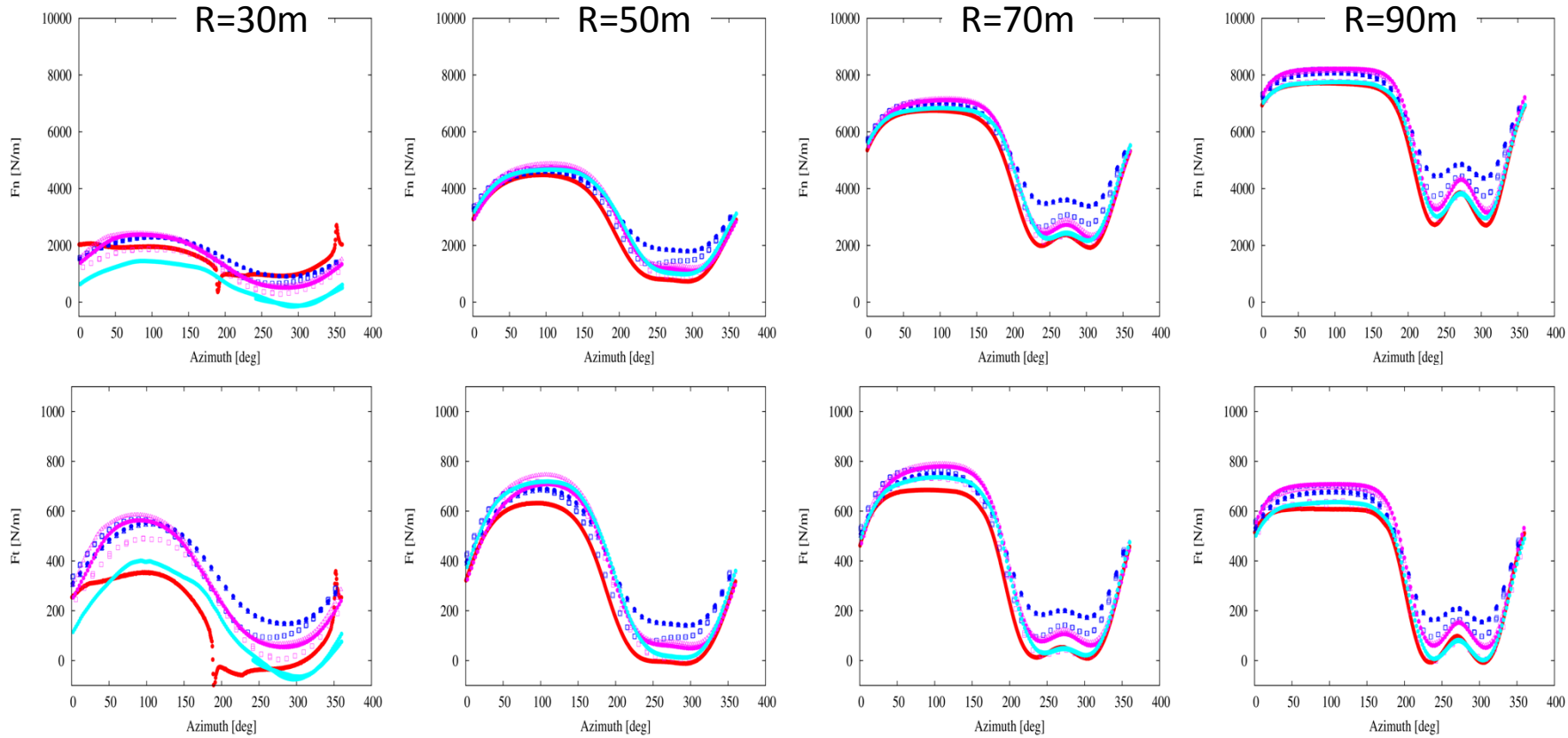
Torque and Thrust

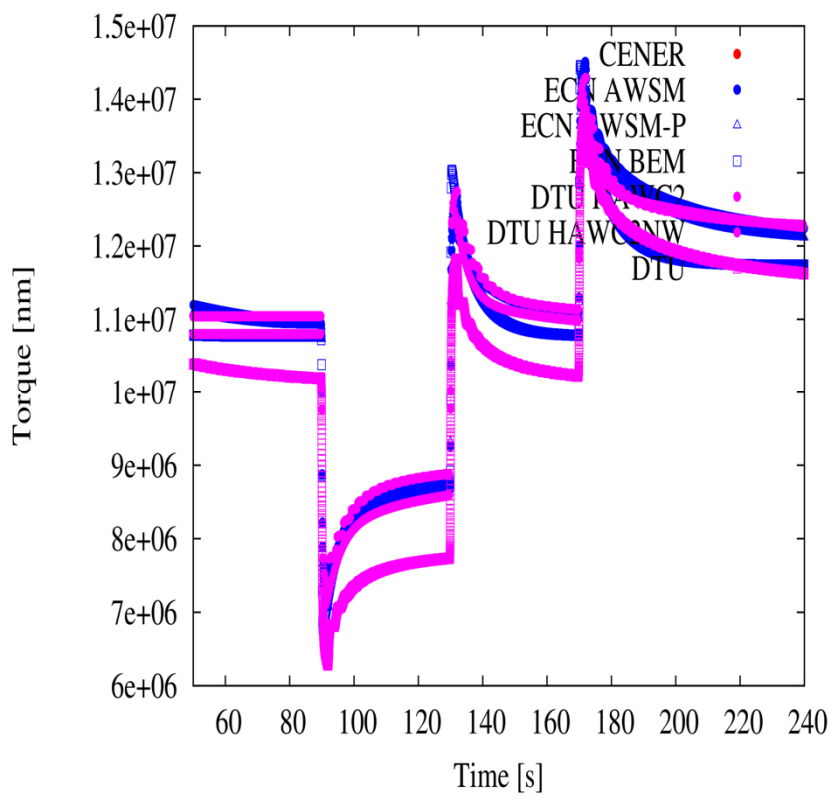
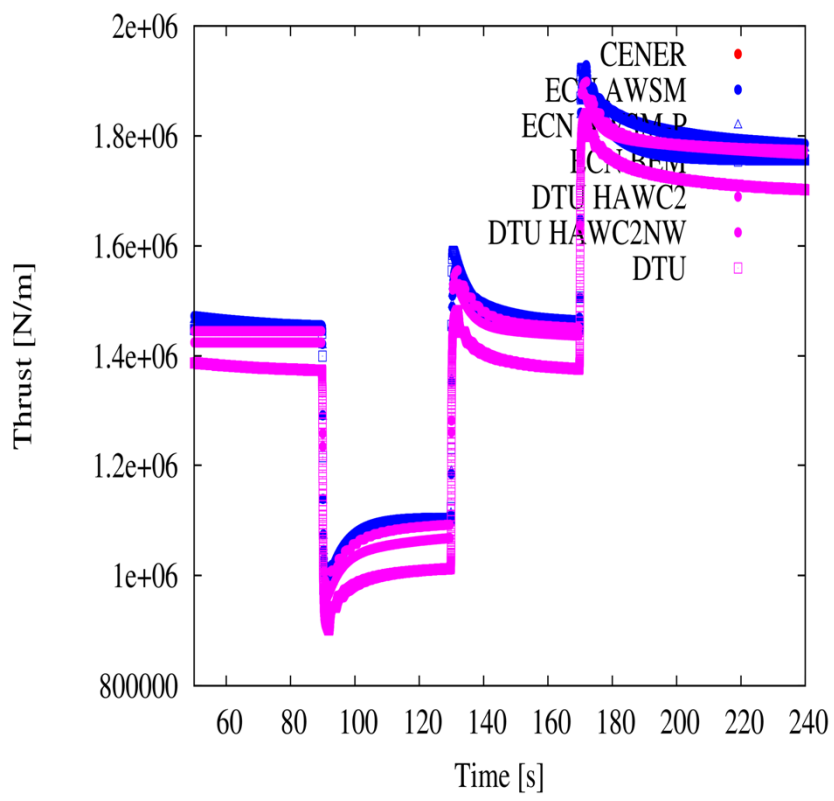




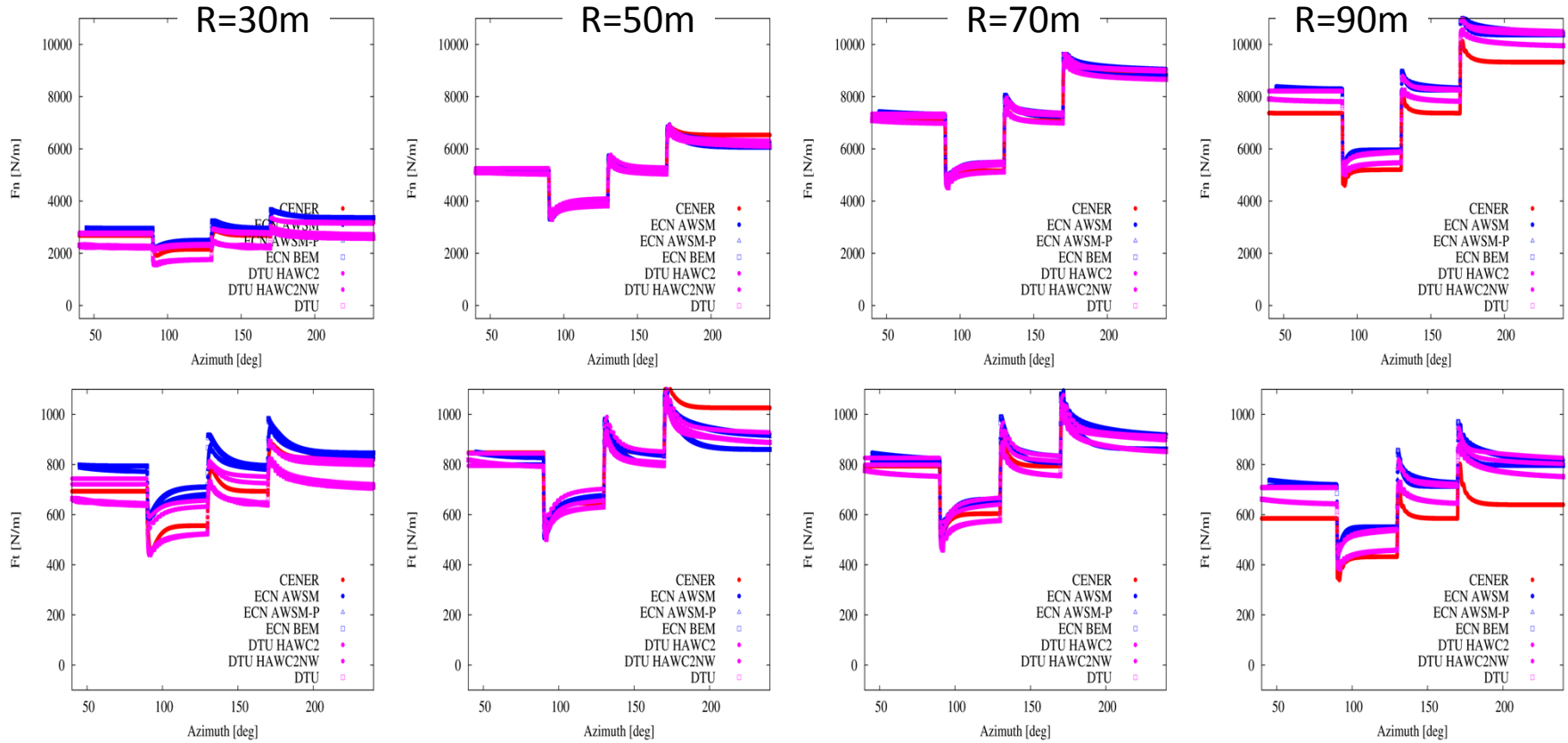








CASE-9 Pitch Step



- Airfoil data, 360 degrees, VG's and flaps, and compressible effects have been investigated
- New methods for AoA determination also in dynamic situations have been developed
- Tip loss model implementation
- The comparison with HPC simulations have revealed that e.g. the yaw cases are difficult for the eng. models
- Global versus local induction modeling
- Vortex models are a intermediate level that can be used to guide the development of eng. models

Coordinator:



Partners in alphabetical order:





Thank you for your attention

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