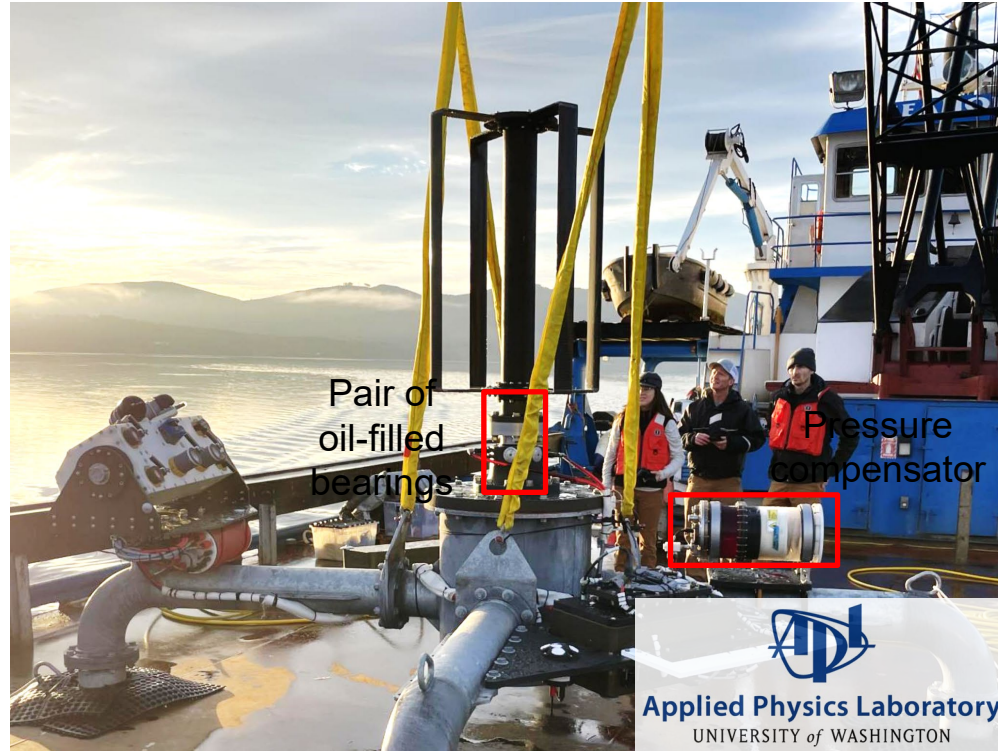


Effects of a support structure on cross-flow turbine performance

Jayden Wood, Brian Polagye, Gemma Calandra, Harlin Wood, Christopher Bassett, Owen Williams

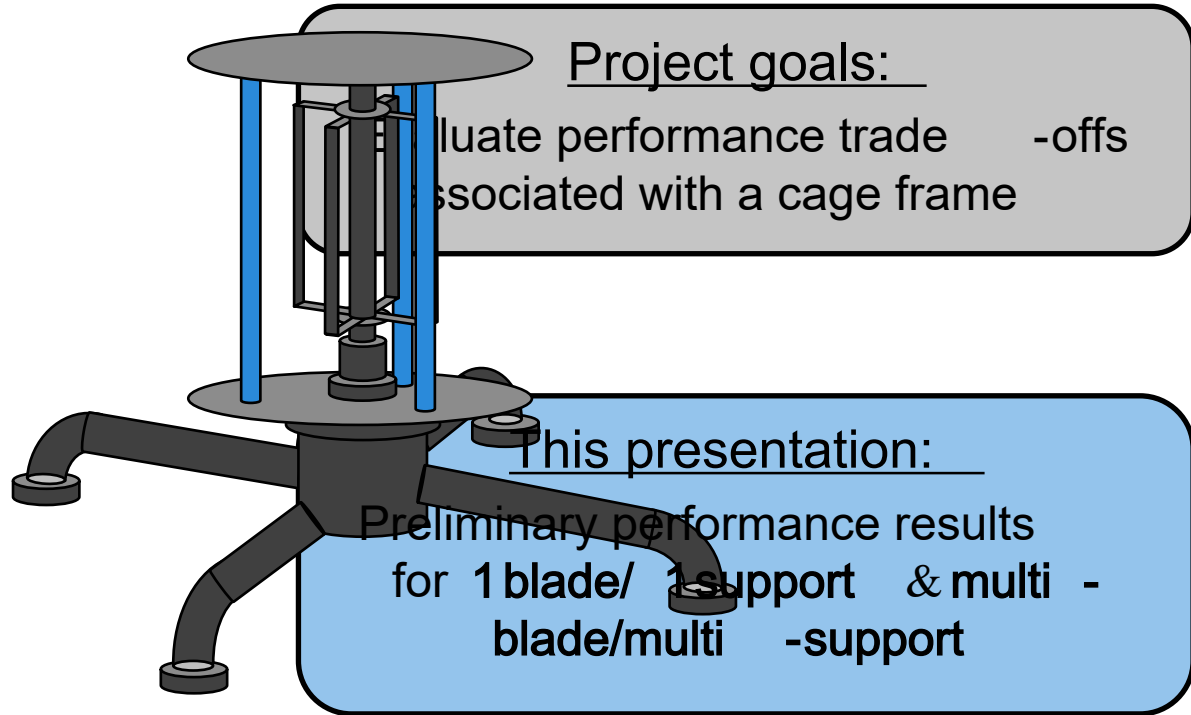


APL Turbine -Lander

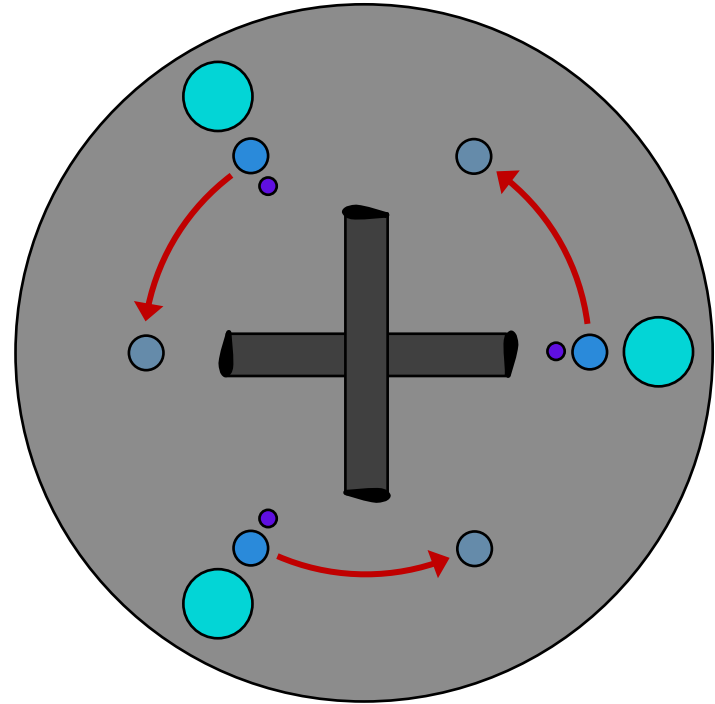
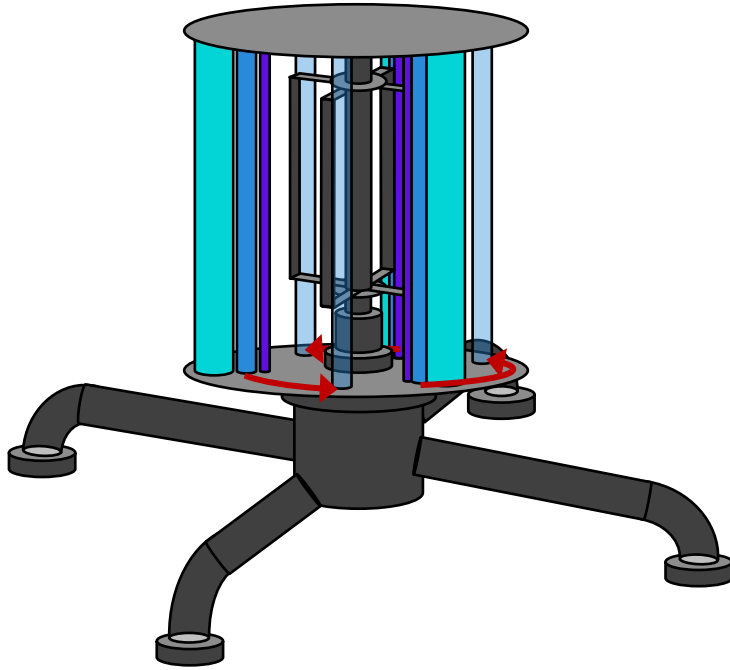


Credit: Chris Bassett

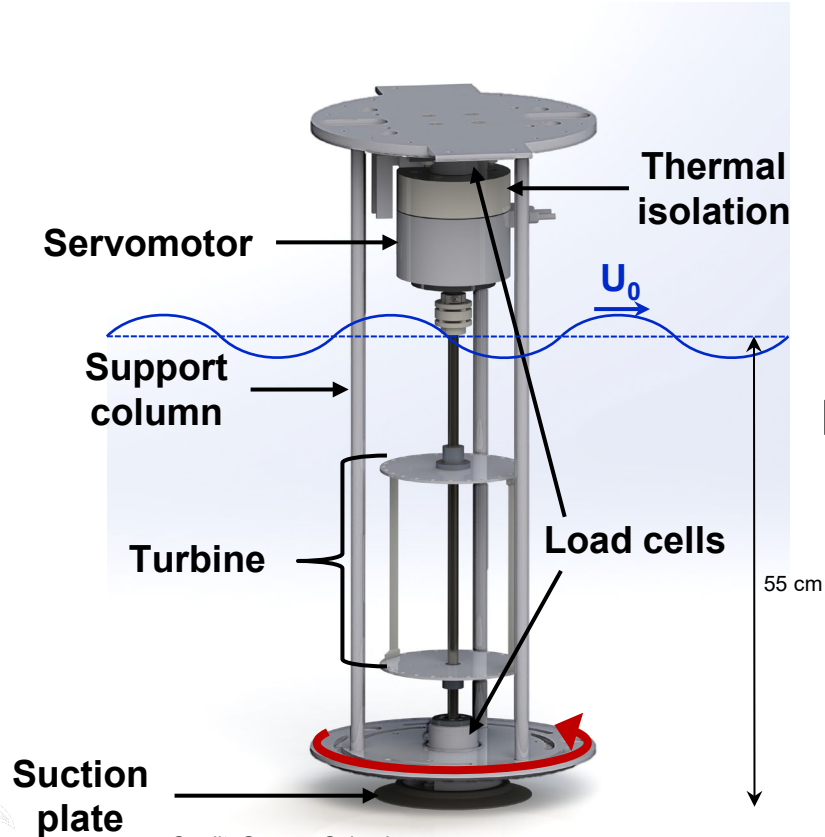
Turbine -Lander



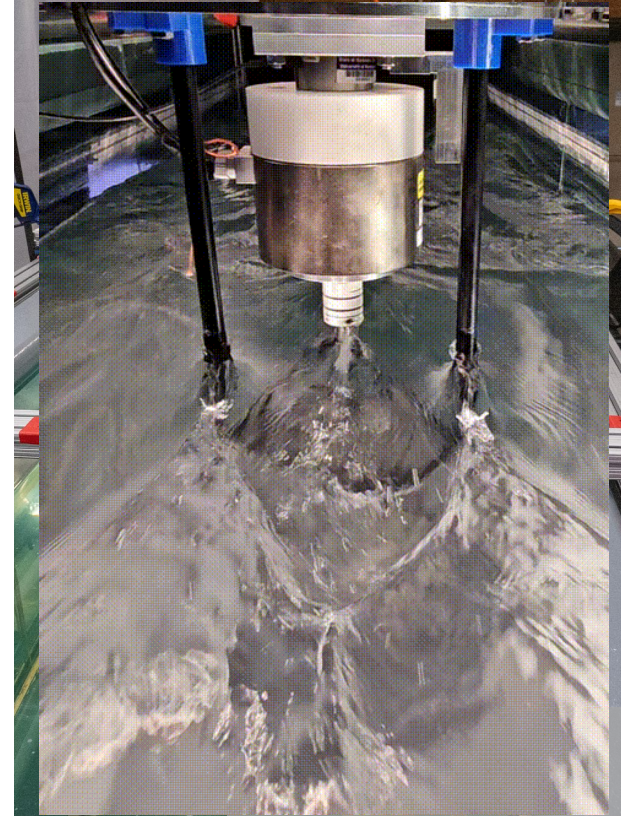
Design Parameters



Experimental Setup

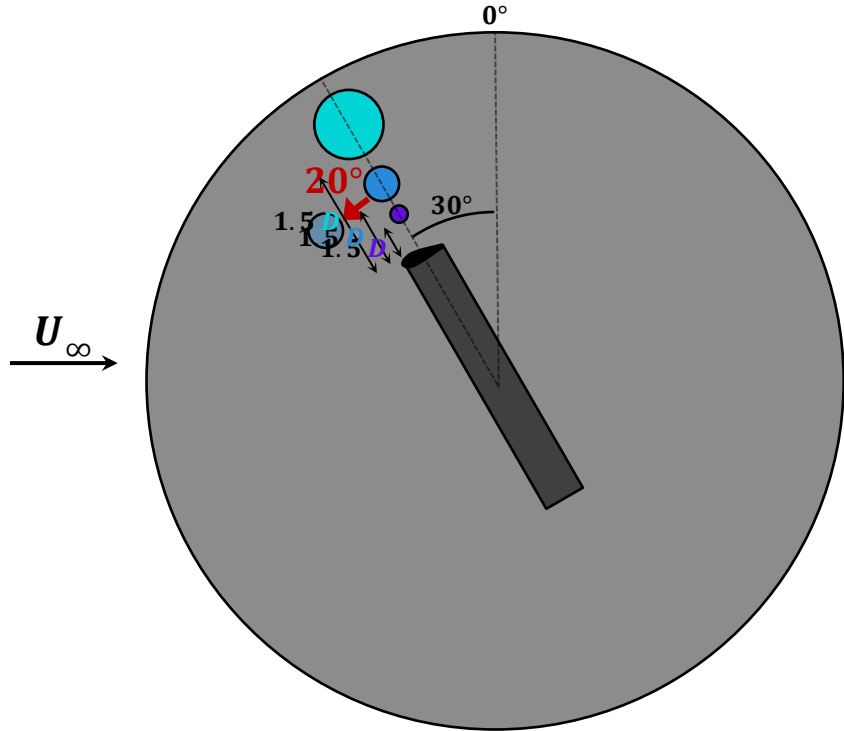
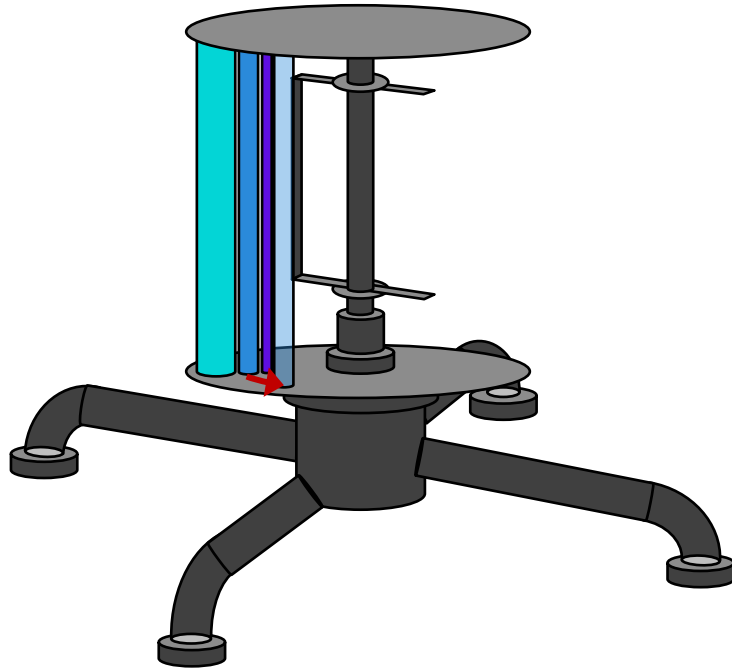


Credit: Gemma Calandra

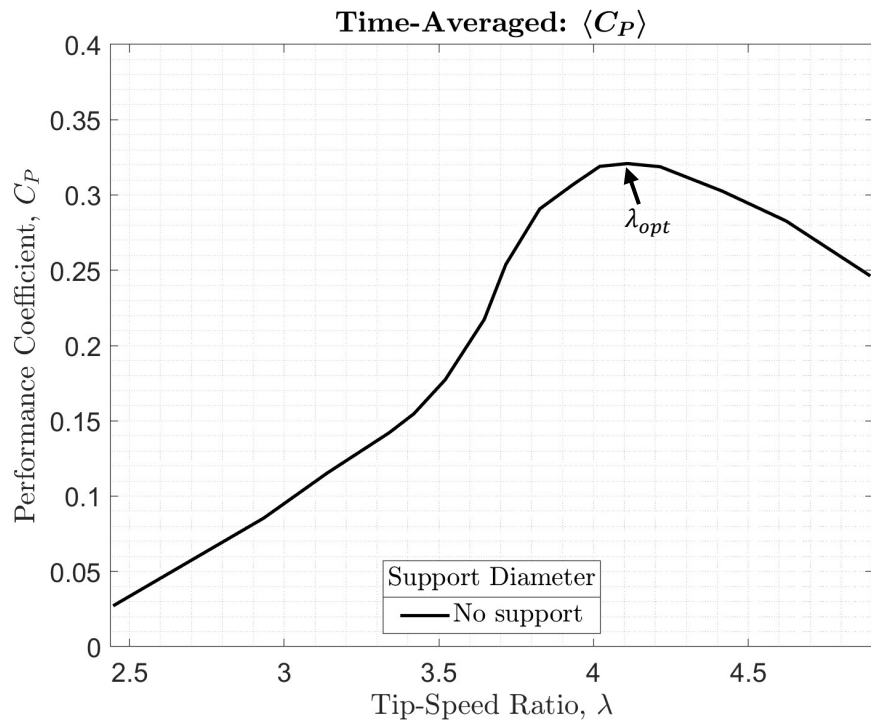


Credit: Andrew H. Freeberg

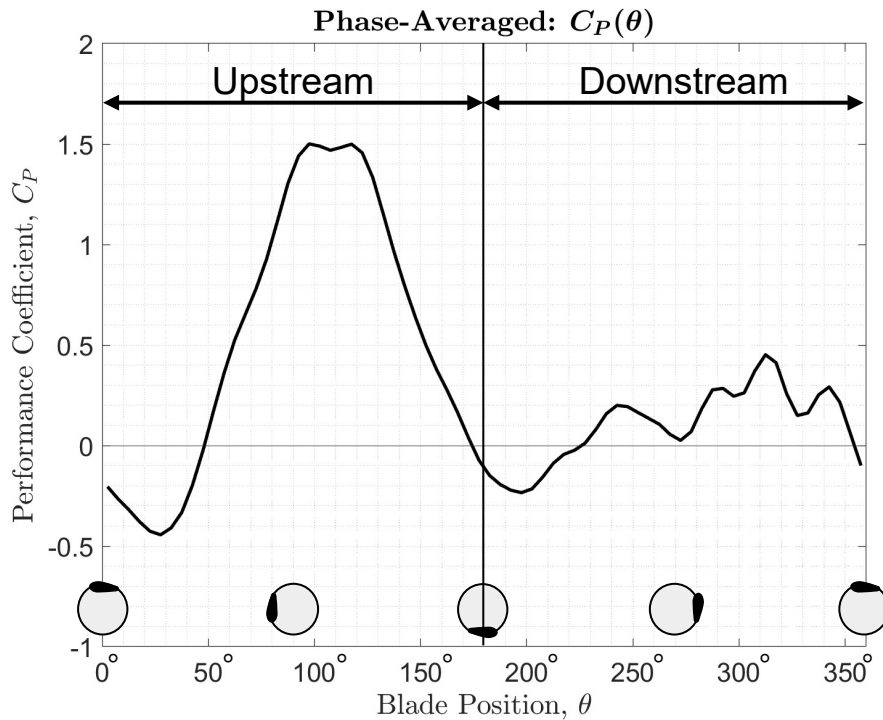
1-blade/1-support



1-blade/1-support

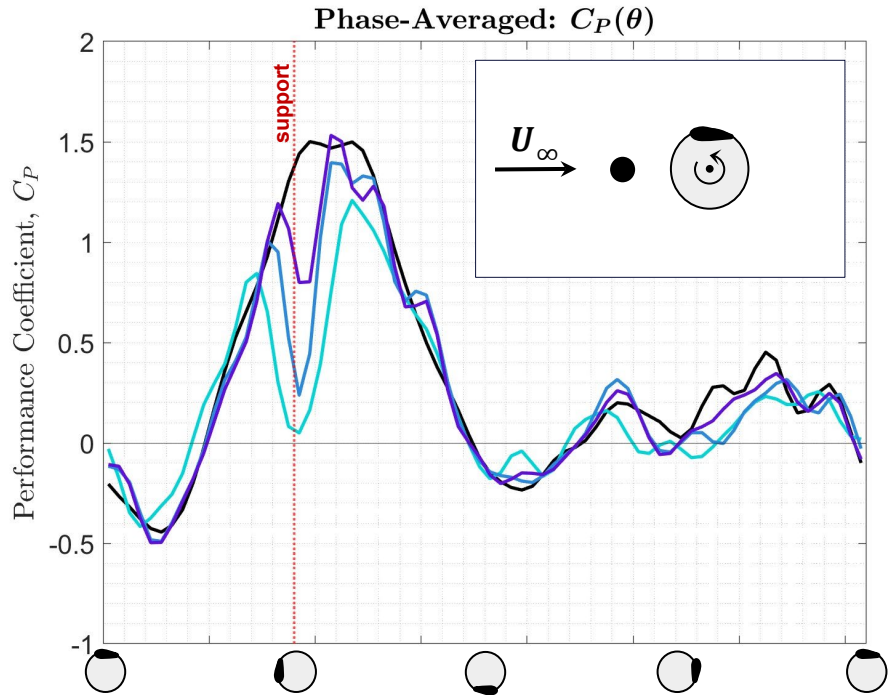
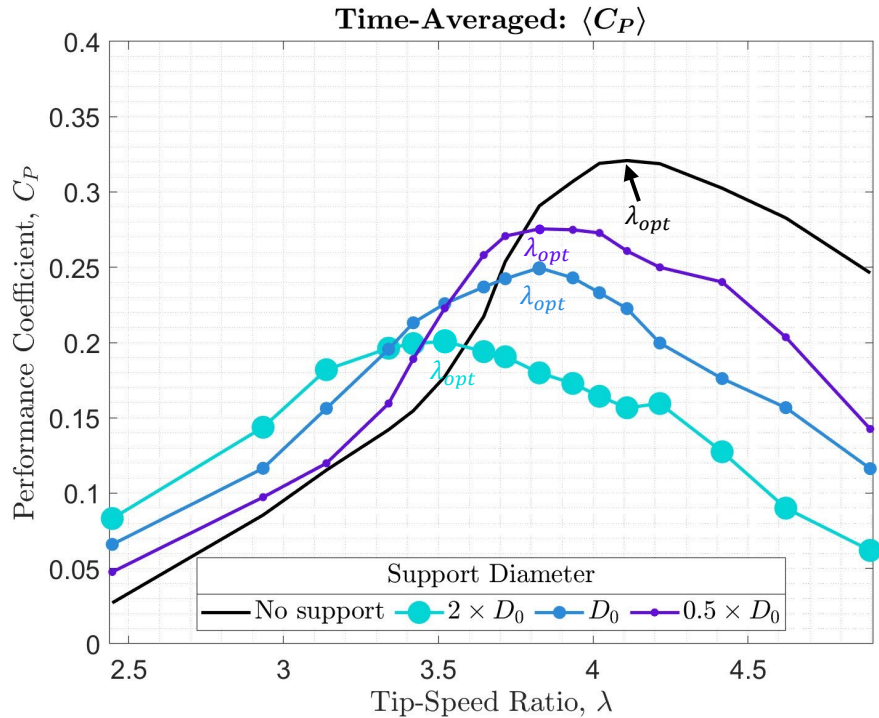


$$\langle C_P \rangle = \langle C_P(t) \rangle \quad \lambda = \left\langle \frac{\omega(t)R}{U_0(t)} \right\rangle$$

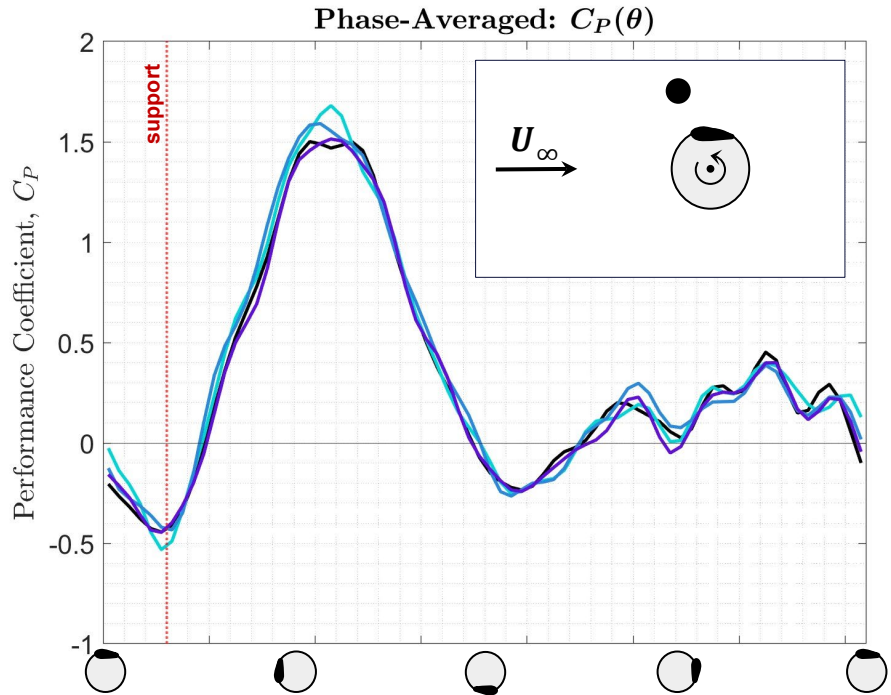
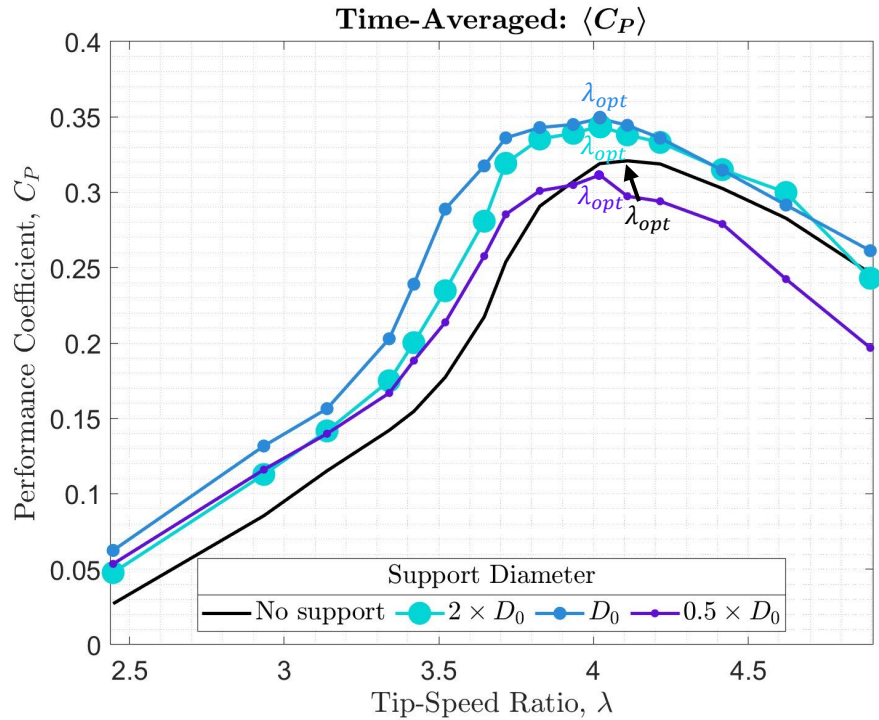


$$C_P(\theta) = \langle C_P(t) | \theta \rangle$$

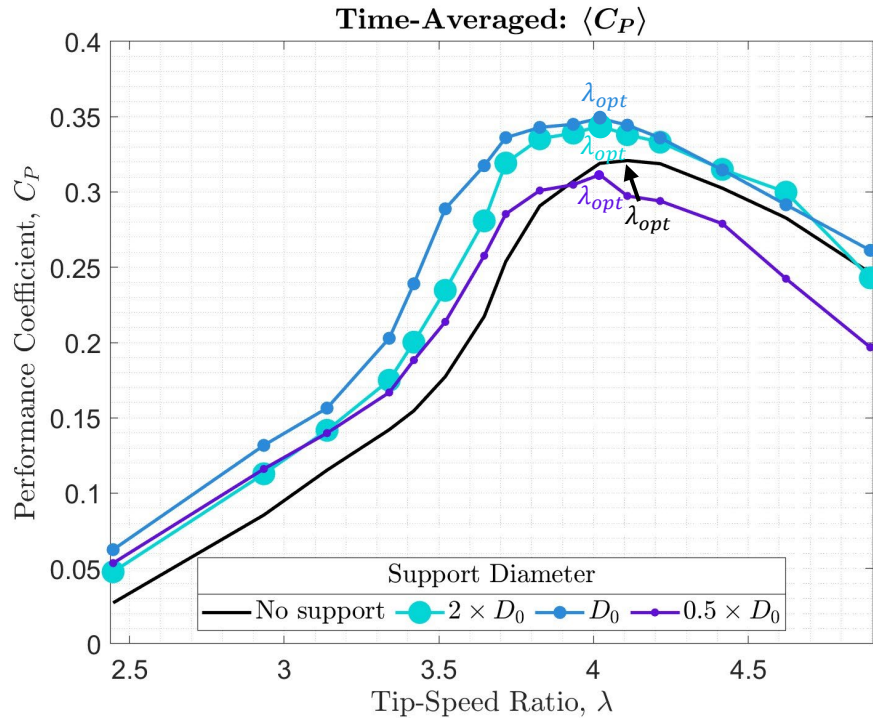
1-blade/1-support



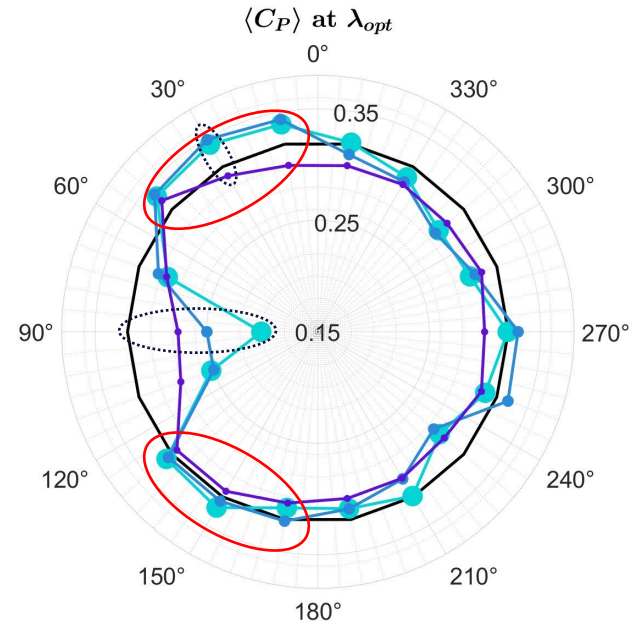
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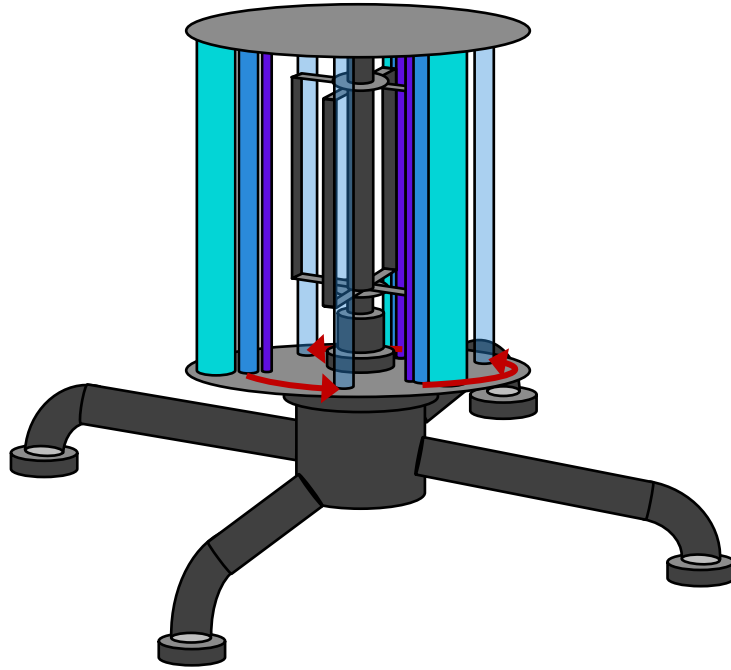
1-blade/1-support



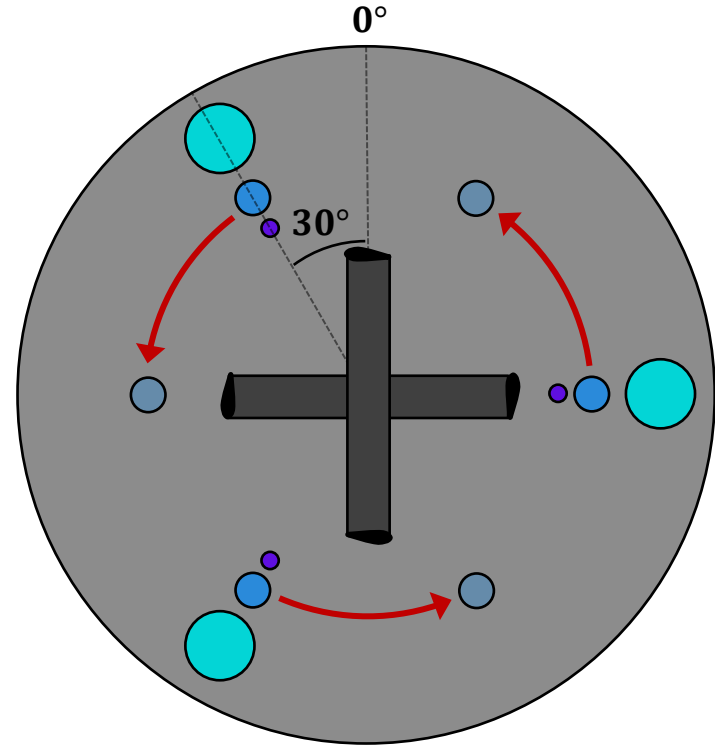
U_∞



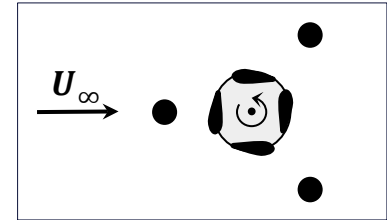
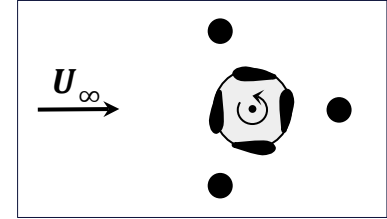
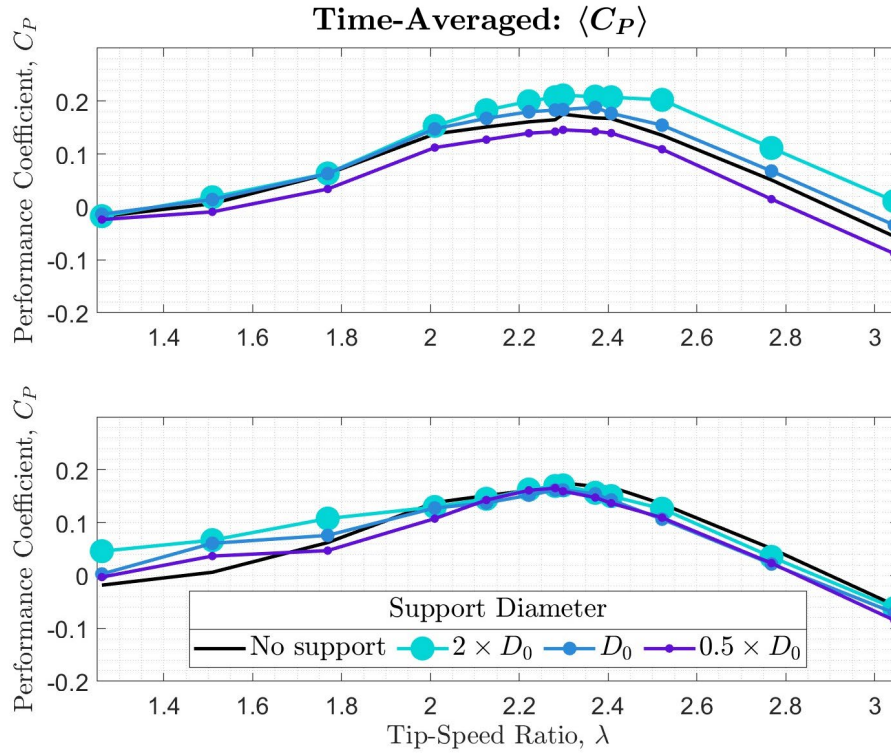
Multi-blade/Multi-support



U_∞

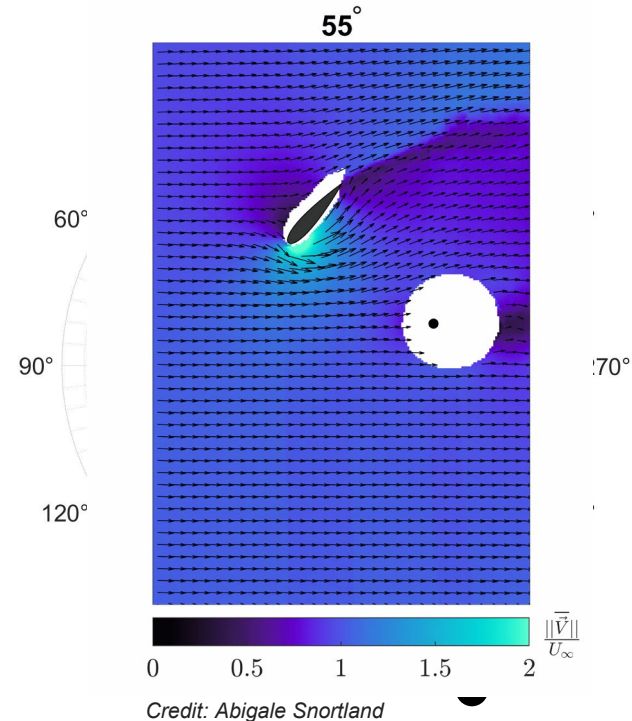


Multi-blade/Multi-support



Conclusions

- Support azimuthal position has an asymmetrical effect on performance
- Turbine experiences best & worst performing cases
- Evaluate underlying hydrodynamics for blade-support interaction



Acknowledgements

Advisor: Dr. Brian Polagye

Collaborators

MREL colleagues

Funding:



An underwater scene with a deep blue background. In the upper left, a fish is visible near the surface where light rays and bubbles are present. The rest of the frame is filled with numerous small, bright blue bubbles of varying sizes, creating a textured, dynamic effect.

Questions

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