



Published on *CD-adapco* (<http://www.cd-adapco.com>)

[Home](#) > Incorporation of Multi-Member Substructure Capabilities in FAST for Analysis of Offshore Wind Turbines

---

## Incorporation of Multi-Member Substructure Capabilities in FAST for Analysis of Offshore Wind Turbines

The Fatigue, Aerodynamics, Structures, and Turbulence (FAST) code, developed by the National Renewable Energy Laboratory (NREL), is an aero-hydro-servo-elastic tool widely used for analyzing onshore and offshore wind turbines. This paper discusses recent modifications made to FAST to enable the examination of offshore wind turbines with fixed-bottom, multi-member support structures (which are commonly used in transitional-depth waters). This paper addresses the methods used for incorporating the hydrostatic and hydrodynamic loading on multimember structures in FAST through its hydrodynamic loading module, HydroDyn. Modeling of the hydrodynamic loads was accomplished through the incorporation of Morison and buoyancy loads on the support structures. Issues addressed include how to model loads at the joints of intersecting members and on tapered and tilted members of the support structure. Three example structures are modeled to test and verify the solutions generated by the modifications to HydroDyn, including a monopile, tripod, and jacket structure. Verification is achieved through comparison of the results to a computational fluid dynamics (CFD)-derived solution using the commercial software tool STAR-CCM+.

**Author Name:**

H. Song  
A. Robertson  
J. Jonkman  
D. Sewell

**Industries:**

**Products:**

**Conference:**

CD-adapco is the world's largest independent CFD focused provider of engineering simulation software, support and services. We have over 30 years of experience in delivering industrial strength engineering simulation.

---

**Source URL:** <http://www.cd-adapco.com/presentation/incorporation-multi-member-substructure-capabilities-fast-analysis-offshore-wind>