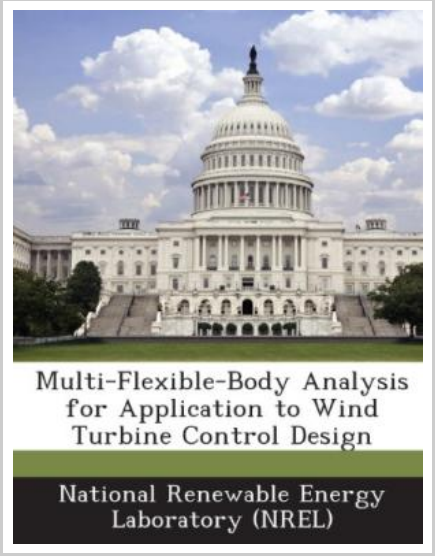

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Multi-Flexible-Body Analysis for Application to Wind Turbine Control Design

By National Renewable Energy Laboratory (NREL)

Bibliogov, United States, 2012. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book ***** Print on Demand *****.A computational framework for aeroelastic analysis of Horizontal Axis Wind Turbines (HAWT s) is presented. The structural model is separated into multi-rigid-body and flexible-body parts. Equations for the former are derived using Kane s method; and the flexible portions are assumed to be beam-like structures, described using a mixed formulation. The equations of motion are of a relatively low order in terms of geometrically-exact beam finite elements. The flexible and rigid subsystems are coupled with an aerodynamic model to form an aeroelastic analysis. A nonlinear, periodic, steady-state solution and a linearized transient solution about the periodic steady state are obtained. The computational framework for two-bladed, HAWT s is built using time finite elements over a half-period. The linearized ordinary differential equations have periodic coefficients in time, and a Floquet stability analysis for the linearized system is directly undertaken using periodic steady state results. Numerical results are presented for horizontal axis wind turbines including steady-state response and Floquet characteristic exponents and operating mode shapes. Effects on the dynamics of the system for pre-cone, rotor speed, teetering hinge lateral offset,...

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