The manuscript presents a novel methodology for applying aerodynamic loads from BEM solvers to a FFRF-based reduced-order multibody model of wind turbine blades built from solid finite elements, addressing key challenges in load transfer and internal DOF load application. It conducts systematic nonlinear static and modal analyses on an isotropic beam and a 12.6 m DTU wind turbine blade, comparing the proposed model with Abaqus solid FE and HAWC2 beam models to validate its accuracy. I recommend acceptance with revisions, and the specific suggestions are as follows:

1. Introduction Section: The manuscript should further clarify the specific engineering pain points of traditional beam model-based aeroelastic simulation tools in wind turbine blade analysis, such as quantitative data on the error of beam models in capturing torsional behavior or cross-sectional deformation of composite blades. Explicitly point out the core innovation of the proposed solid FE-based reduced-order model relative to existing FFRF models (e.g., how the combination of Hurty/Craig-Bampton method and interface reduction overcomes the limitations of beam element discretization).
2. Methodology Section (Load Application Strategy): The derivation process of the equivalent concentrated load calculation (Section 3.1) lacks detailed mathematical derivation and parameter definition, such as the specific order of Gauss-Legendre quadrature used for load integration, and the calculation formula of the weighted average position of coupling nodes in RBE3 constraints. Additionally, explain the reason for selecting full cross-section nodes instead of spar caps nodes for load coupling, and supplement the trade-off analysis between computational efficiency and load application accuracy.
3. Methodology Section (Minimum Strain Energy Interfaces): The implementation steps of the MSE interface formulation (Section 3.1.1) are relatively abstract, and it is recommended to add schematic diagrams and key parameter explanations for the decomposition of interface node motion (rigid body + deformation) and the calculation of the reduction basis Ψ b,MSE. Clarify the physical meaning of the matrix P in Eq. (20) and the reason for using SVD to update the interface reduction matrix between adjacent sub-bodies, to enhance the reproducibility of the method.
4. Results Section (Isotropic Beam Analysis): The analysis of the distributed triangular surface load case (Section 4.1.1) lacks quantitative analysis of convergence characteristics, such as the relationship between the number of concentrated load points and the error of static response, and the determination criteria of the optimal number of load points. Additionally, supplement the analysis of the influence of load direction fixedness ($n = [0\ -1\ 0]$) on the simulation results, and discuss the adaptability of the method to follower loads that change with blade deformation.
5. Results Section (DTU 12.6 m Blade Analysis): When comparing the torsional response of different models (Section 4.2), it is recommended to strengthen the combination with the actual structural characteristics of the blade, such as linking the poor torsional simulation effect of HAWC2 to the abrupt changes in blade material and shear web structure, and supplementing the stress/strain distribution comparison of key cross-sections (e.g., root, maximum chord position) between the Exudyn model and the Abaqus reference model.
6. Discussion Section: The manuscript currently focuses on static and modal analysis, and the discussion of dynamic response and engineering application potential is insufficient. It is recommended to add the challenges of applying the proposed methodology to dynamic aeroelastic simulation (e.g., load update frequency, computational efficiency), and supplement the analysis of

the model's scalability for large-scale wind turbine blades (e.g., 100+ m blades) and composite material blades with complex layups.

7. Conclusion Section: Clearly refine the core conclusions and quantitative performance indicators of the study, such as the maximum error range of the baseline Exudyn model relative to the Abaqus solid FE model in key response indicators (displacement, rotation, natural frequency), and the critical conditions for the inclusion of internal load interfaces to improve simulation accuracy. At the same time, add specific and actionable future research directions, such as the integration of the proposed model with BEM-based aeroelastic solvers, and the optimization of the MSE interface formulation to reduce artificial stiffening.