Wind Energ. Sci. Discuss.,
https://doi.org/10.5194/wes-2018-64-AC2, 2018

WESD

Interactive comment

Interactive comment on "Determination of Natural Frequencies and Mode Shapes of a Wind Turbine Rotor Blades using Timoshenko Beam Elements" *by* Evgueni Stanoev and Sudhanva Kusuma Chandrashekhara

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Received and published: 27 November 2018

Thanks very much for your comments.

In connection with your first remark to the cited paper by Bazoune, A., & Khulief, Y. (2003) : we have used just the shape functions for Timoshenko beam elements, presented in (JSV,2003), and have described them detailed in the article – Eqs. (31), (32), (35), (36). They are employed, see Eq. (37), only for the inertia-forces term in Eq.(17), and have not been used in the derivation of the element stiffness matrix K(e) in Eq.

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(43). The stiffness matrix is developed by numerical Runge-Kutta integration of the coefficient matrix A of the differential equations system, Eq.(16), for Timoshenko beam – in the form of Eq. (14). In the frame of this integration, described in Sec. 3.4, first the static field matrix L(e), see Eq. (41), is built, and finally the element stiffness matrix K(e) - by the operations shown in Eq.(43).

The formulation of the element mass matrix by similar numerical integration of the inertia-force matrix bm, see Eq.(17)-(18), is in fact reproduced from earlier publication of the first author (Stanoev 2007) where only Bernoulli beam element is consided. In the present article are combined the numerical procedure for assembly of the element mass matrix with the above mentioned Timoshenko shape functions.

To your remarks on the numerical example, I admit, we haven't study the sensitivity of the eigenfrequencies to the choice of the shear correction coefficients. I will add, similarly to Tab.1, two additional tables with different shear coefficients approximation and for comparison of Bernoulli to Timoshenko beam model.

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