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Readers' Forum

Brief discussion of previous investigations in the aerospace sciences and technical comments on papers published in the AIAA Journal *are presented in this special department. Entries must be restricted to a maximum of 1000 words, or the equivalent of one* Journal *page including formulas and figures. A discussion will be published as quickly as possible after receipt of the manuscript. Neither the AIAA nor its editors are responsible for the opinions expressed by the correspondents. Authors will be invited to reply promptly.*

Comment on "Improvement in Model Reduction Schemes Using the System Equivalent Reduction Expansion Process"

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THE authors of Ref. 1 presented a numerical method for model reduction schemes using the system equivalent reduction expansion (SEREP) process. However, the method is valid only when the Guyan reduction has very high accuracy. It means that the validity of the method in Ref. 1 depends deeply on the choice of the master degrees of freedom (DOFs). A number of authors have considered the selection of an appropriate master DOF set.[2–4] Unfortunately, although the appropriate master DOF set is used, the errors of frequencies with Guyan reduction are usually very large.[5] Moreover, the selection schemes of master DOFs will be invalid in many cases.[6]

The numerical example of a uniform cantilevered beam[1] demonstrates our opinion. In Table 1, the master DOFs, equivalent to those of Ref. 1, are the transverse DOFs at nodes 2, 4, 6, 8, 10, and 12 for case 1. For case 2, the master DOFs are the transverse DOFs at nodes 7–12, and for case 3 they are the rotational DOFs at nodes 1–6.

The results indicate that when Guyan reduction has high accuracy, the SEREP–Guyan has smaller errors than the Guyan. However, when Guyan reduction has low accuracy, the SEREP–Guyan has larger errors than the Guyan at majority frequencies.

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Reply to Z.-Q. Qu and Z.-F. Fu

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THE authors thank Qu and Fu for their interest and examination of our paper.[1]

They present a case where the SEREP–Guyan approach produces larger errors than the Guyan method for a different set of master

Table 1 Errors of beam natural frequencies (Hz) from different cases

	Case 1		Case 2		Case 3	
Mode	Guyan	SEREP–Guyan	Guyan	SEREP–Guyan	Guyan	SEREP–Guyan
1	0.000001	0.000000	0.000072	0.000000	0.025081	0.000056
2	0.000417	0.000000	0.026975	0.000012	0.311917	0.534706
3	0.003388	0.000000	0.335096	1.08737	0.917563	1.51624
4	0.014125	0.000023	0.946580	1.40021	1.50816	1.50714
5	0.037918	0.000387	1.67978	1.88315	2.15232	2.82557
6	0.040935	0.005863	2.51075	2.50444	2.92630	3.33190

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