JAS-1290

"An Improvement to the QUEST algorithm," Yang Cheng and Malcolm D. Shuster, submitted to *The Journal of the Astronautical Sciences*.

This work was written in response to an article in the JAS by Markley and Mortari which showed for an extreme example (scenario 2 of their article) that the QUEST algorithm did not perform as well as the algorithms developed by Markley and Mortari. 2007a showed that (1) the example of Markley and Mortari was highly unphysical and required a very stupid attitude determination system design; and (2) the poor performance required as well the deletion from QUEST of internal tests which would have inhibited the poor performance claimed by Markley and Mortari.

In the present work, we show that by a slight rearrangement of terms in the QUEST characteristic polynomial, namely,

$$\lambda^4 - (a+b)\lambda^2 + ab \rightarrow (\lambda^2 - a)(\lambda^2 - b)$$

this poor behavior of Markley and Mortari's version of QUEST disappears entirely. Making the inverse rearrangement of terms in the characteristic polynomial for the Markley and Mortari algorithms caused them to display the identical poor performance for scenario 2, that previosuly claimed for QUEST.

See also JAS-1294 for a critique of the speed tests of Markley and Mortari.

QUEST lives!

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