

EXTENSIONS OF THE HHT- α METHOD TO DIFFERENTIAL-ALGEBRAIC EQUATIONS IN MECHANICS*

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Abstract. We present second order extensions of the Hilber-Hughes-Taylor- α (HHT- α) method for systems of overdetermined differential-algebraic equations (DAEs) arising, for example, in mechanics. A detailed analysis of extensions of the HHT- α method is given. In particular a local and global error analysis is presented. Second order convergence is theoretically demonstrated and practically illustrated by numerical experiments. A new variable stepsize formula is proposed which preserves the second order of the method.

Key words. differential-algebraic equations, HHT- α method, variable stepsize

AMS subject classifications. 65L05, 65L06, 65L80, 70F20, 70H45

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