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A new staggered algorithm for thermomechanical coupled problems

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Abstract

This study presents a new staggered coupled strategy to deal with thermomechanical problems. The proposed strategy is based on the isothermal split methodology, i.e. the mechanical problem is solved at constant temperature and the thermal problem is solved for a fixed configuration. Nevertheless, the procedure for this strategy is divided into two phases within each increment: the prediction and the correction phases, while the interchange of information is performed on both. This allows taking advantage of automatic time-step control techniques, previously implemented for the mechanical problem, which is the main feature that distinguishes it from the classical strategies. The aim of the proposed strategy is to reduce the computational cost without compromising the accuracy of the results. The new coupling strategy is validated using three numerical examples, comparing its accuracy and performance with the ones obtained with the classical (commonly employed) strategies for solving thermomechanical problems. Moreover, the influence of the time-step size on the accuracy is analysed. The results indicate that the proposed strategy presents accuracy close to

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