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A TECHNIQUE FOR RECOVERY OF EQUILIBRIUM ON STAR PATCHES VIA A PARTITION OF UNITY

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ABSTRACT

The use of approximate solutions of solid mechanics problems that locally satisfy all equilibrium conditions, paired with the more usual conforming solutions, has become a normal technique in the context of obtaining bounds of the discretisation error, either for global or for local quantities [1,2].

These solutions can be obtained from global equilibrium analyses [3], but it is often argued that their costs are prohibitive. To avoid this penalty some variant of the "Ladevèze-Maunder" equilibration technique [4] can be applied, using patches of elements and the global equilibrium properties of the conforming solution, to obtain, element by element, a solution that is locally equilibrated.

An alternative way to recover equilibrium is based on a partition of unity decomposition of the prescribed loads so that each star patch can be separately analysed subject to its share of the load [5,6].

In this communication we present a variant of this technique whereby each star patch is considered subject to a self-balanced system of loads and homogeneous boundary tractions, producing local problems that are uniquely defined.

We also show how the results derived for global equilibrium models [3] can be used in this context.

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