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DUCTILE DAMAGE UNDER NON-PROPORTIONAL LOADING CONDITIONS

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ABSTRACT

Evaluating the correct mode of material failure is crucial in many manufacturing industries. Not only does doing so help prevent sudden malfunctions, it can also mean better-designed components and structures, which is economically advantageous. In recent years, the topic of ductile damage has been widely investigated, leading to the development of theoretical and numerical models that incorporate the effects of stress triaxiality and Lode angle, which are the main factors regulating damage evolution.

Recent studies [1,2] have expanded the borders of research in this area, revealing that non-proportionality of the loading paths affects the total deformation at fracture. In particular, the total deformation at failure seems to be higher when the load is proportional, suggesting that a different mechanism has to be taken into account whenever non-proportionality is triggered.

The current literature still lacks clarification of the effect of non-proportional loading on the ductile damage evolution, which could lead to a better understanding of the damaging mechanism and to the development of novel strategies for numerical simulations.

REFERENCES

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