Reliability based topology optimization for continuum structures with local failure constraints
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This paper presents an effective method for stress constrained topology optimization problems under load and material uncertainties. Based on the Performance Measure Approach (PMA), the optimization problem is formulated as to minimize the objective function under a large number of (stress-related) target performance constraints. In order to overcome the stress singularity phenomenon caused by the combined stress and reliability constraints, a reduction strategy on target reliability index is proposed and utilized together with the ε-relaxation approach. Meanwhile, an enhanced aggregation method is employed to aggregate the selected active constraints using a general K–S function, which avoids expensive computational cost from the large-scale nature of local failure constraints. Several numerical examples are given to demonstrate the validity of the present method.

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