

VGI^{cyclic} increases and decreases based upon the sign of triaxiality, and the quantity of $VGI^{critical}$ decreases based on the accumulation of plastic strain at the beginning of each tensile excursion of loading. In Fig. 8, the intersection of two plots predicts the failure point.

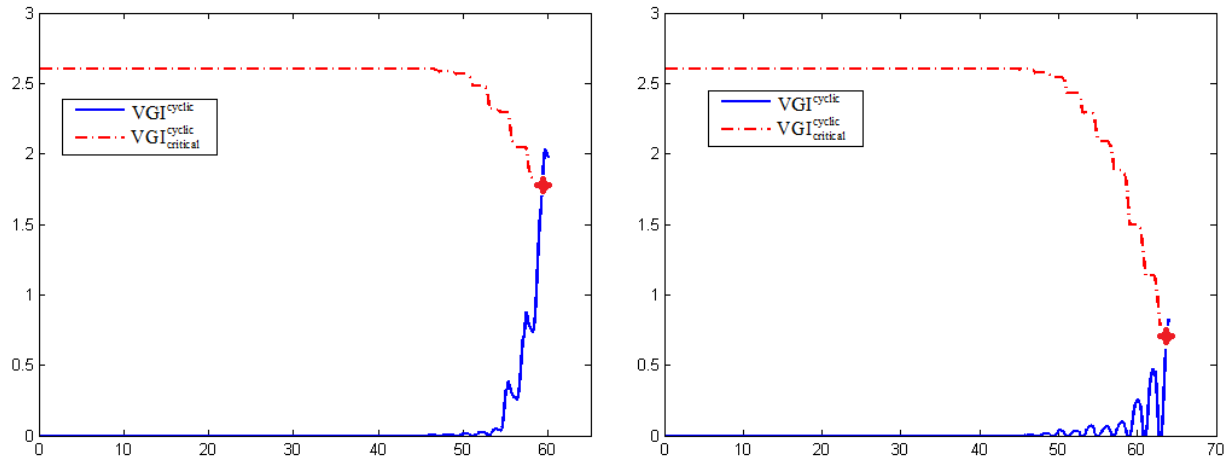


Fig. 8 Evolution of CVGM demand and capacity (a) Crack initiation (b) Final failure

6. CONCLUSIONS

In this paper, cyclic void growth model has been applied to predict the crack initiation and subsequent fracture in a steel moment connection subjected to high amplitude loading with few number of cycles. To assess the applicability of this micromechanical model, a finite element model of a connection previously tested is simulated with ABAQUS. A FE code is utilized to simulate the behavior of cracking within the context of continuum damage mechanics during ultra-low cycle fatigue. It has been observed that CVGM successfully determines the crack initiation. Hereafter, crack propagation is modeled halfway through beam bottom flange by removing totally damaged elements. The result is reasonably consistent with experimental test. Furthermore, another analysis was conducted to evaluate fracture index at different points without taking the effect of material degradation into account. The numerical results were then compared with those of the test, and they were acceptable in terms of fracture path and instance of failure. As the final remark, cyclic void growth model acts as a strong numerical tool for predicting fracture in the specimen considered in this study.

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