
Title: Experimental investigation into hysteretic behaviour of high strength S690 steel under different targeted strains

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Abstract: This paper presents an experimental investigation into hysteretic behaviour of high strength S690 steel under different targeted strains. After a critical review on suitability of various low cycle high strain cyclic tests reported in the literature, a test method with a specific loading protocol, a specific geometry of test coupons and a number of loading cycle frequencies was proposed. A total of six standard tensile tests were conducted to establish their basic mechanical properties while sixteen low cycle high strain cyclic tests were conducted according to the proposed test method. It should be noted that in these cyclic tests, four different targeted strains, namely, 5, 10 % 12 % and 15 % were specified, and four different loading cycle frequencies, namely, 0.1, 0.5, 1.0 and 2.0 Hz were adopted. After a rational analysis on the test data, an assessment on suitability of the steel material to be used in seismic resistant structures was presented. It was shown that through the proposed test method, the high strength S690 steel material was demonstrated to possess a hysteretic ductility up to 10 % under the specific loading protocol of the proposed test method.