## Abstract Submitted for the MAR15 Meeting of The American Physical Society

Self-affine parameters of fracture surfaces of high strength steels MOISĖS HINOJOSA, ELISA SCHAEFFER, YOSHUA GUZMAN, JORGE AL-DACO, Universidad Autónoma de Nuevo León — We report the experimental study of crack nucleation and propagation on AISI 4340 and Premomet steels, submitted to different thermal treatments that resulted in different properties and microstructures. Crack initiation and propagation under fatigue, tension and impact conditions were analyzed at different lengthscales. The SEM fractographic study allowed the correlation of the observed mechanisms with the patterns observed on the fracture surfaces. The scaling properties were explored and correlated to the observed mechanisms. Using the topographic data of 3D reconstructed surfaces obtained by laser scanning, we calculated both global and local roughness exponents using different variable-bandwidth methods, obtaining the statistical distributions as a function of the orientation. Although the results tend to the same average global value (close to 0.8) for both steels regardless of the heat-treating condition, their statistical distributions are sensitive to the anisotropy of the microstructure, we also found a correlation of the local roughness exponents with the local orientation of the microstructure and the dimples observed on the fracture surfaces.

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Date submitted: 14 Nov 2014 Electronic form version 1.4