

Numerical analysis of Hydrogen embrittlement of high strength steels using Monte Carlo method

Soumia Ourrad, F. Javier Belzunce, Youcef Houmadi, Abdelkader Ziadi

Abstract : A probabilistic approach has been applied to hydrogen desorption phenomena in the wire rod for pre-stressed concrete. The phenomena was treated in a deterministic study by Carneiro in 2010, this work aims to reflect uncertainty property of the material of a high carbon steel such as effective diffusion coefficient (D_e) and concentration parameters (C). A probabilistic simulation method of Monte Carlo was used to determine the contribution of each random variable on the variability of reduction in area in our case the limit state criteria required in the study is reduction in area parameter must be greater than or equal to 30% (Carneiro, 2010). Afterwards we study the influence of parameters that govern the phenomenon of desorption of hydrogen and dispersion of the parameters while optimizing calculative time.

Keywords : hydrogen embrittlement, the probabilistic simulation method of Monte Carlo, spatial variability.