post-processor of a commercial finite element package in order to create an user-friend atmosphere for fracture mechanics analysis. The displacement field in the crack tip zone was modeled with quadratic isoparametric elements with the mid-side nodes placed at the quarter position. These elements are known as quarter-point elements. The precision of the methodologies was discussed and analyzed. Different geometry configurations and mesh refinement were tested to verify the applicability of the developed routines. Within this implementation an appropriate integrated environment was created which enables the evaluation of the crack growth governed by the linear elastic fracture mechanics.

Keywords: finite element method, displacement correlation technique.

TRB0371 - ASSESSMENT OF MAXIMUM LOADS IN DUCTILE NUCLEAR PIPING SYSTEMS WITH THROUGH-WALL CIRCUMFERENTIAL CRACKS

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Abstract: The maximum load evaluation of cracked piping systems is a fundamental step toward confirming their fitness for service and the applicability of the Leak-Before-Break concept in nuclear power plants. In this paper, methods based on Limit Load analysis and on Elastic-Plastic Fracture Mechanics for the evaluation of maximum loads in ductile piping with crcumferential through-wall cracks using simplified methods are described. Based on the describer methods, analyses were developed to conduct the assessment of maximum loads supported by the cracked pipes. The results obtained from the analyses are also compared with experimental data available in the literature. Some comments and conclusions are addressed based on the comparison of results.

Keywords: fracture mechanics, limit load.

TRB0373 - DIFFERENT APPROACHES FOR STRUCTURAL INTEGRITY ASSESSMENT OF PWR STEAM GENERATOR TUBES

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Abstract: In a Pressurized Water Reactor (PWR) the Steam Generator (SG) tubes represent the major and also the thinnest part of the primary pressure boundary. Furthermore, the tubes are more sensitive to damage and aging from several degradation modes arising from severe operational conditions, common in almost all heat exchangers. Regarding the safety and economic aspects, the adequate management of tube degradation and tube plugging is an important issue for the plant operation. A fundamental step in tube plugging management is the tube structural integrity evaluation considering different defects arising from different degradation modes, found in in-service inspections (Non-Destructive Examination - NDE), under the various reactor operational conditions and how to consider the involved uncertainties. This work describes some recent approaches developed by EPRI, based on experimental results performed for several and different tube defects morphology using statistics to consider the uncertainties, to assess structural limits of PWR SG tubes. Besides the more sophisticated statistics methods as the Monte Carlo method it is allowed simplified and more conservative methods as well. The approaches will be specified for two cases: tubes having Part Through-Wall Axial Cracking and Through-Wall Axial Cracking. The results obtained from the different approaches are compared and some conclusions and comments are addressed from the comparison.

Keywords: steam generator, statistical approach.