KPECE2 Influence Coefficients Study

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1 Introduction

API 579-1/ASME FFS-1 2021 Fitness-For-Service (API 579) contains a compendium of stress intensity factor solutions in Annex 9B, to be used in the assessment of crack-like flaws. Solutions are available for multiple different component geometries (plates, cylinders, spheres, etc.), crack geometries (surface crack, embedded crack, etc.), and crack loading (membrane and bending stress, through-wall fourth order polynomial, etc.). The stress intensity factor solutions are a function of the crack size, stress state and geometry factors/influence coefficients.

The API/ASME Fitness-for-Service Joint Committee (FFSJC) identified opportunities to update the current influence coefficients for the stress intensity factor solution for embedded elliptical shape cracks in a plate, considering a through-wall fourth order polynomial stress distribution (stress intensity factor solution identifier KPECE2). It was also determined that the influence coefficients currently limited to a crack aspect ratio of $a/c = 1.0$ (where a is the half crack depth and c is the half crack length) could be expanded up to a crack aspect ratio of $a/c = 2.0$ to cover a larger range of potential cracks.

The American Petroleum Institute (API) led a study to compute new influence coefficients for the KPECE2 stress intensity factor solutions, updating the existing influence coefficients and expanding the solution to cover larger crack aspect ratios.