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Title:

Thickness and crack size effects on fatigue crack driving forces

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Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

This work revisits the main initial driving force for the Hyannis conferences, the arguments about the actual crack driving forces for fatigue crack growth (FCG), because this controversy is very much alive after all those years.

To do so, it first reviews the evidences that support Elberian ideas, as well as those that question it, emphasizing the most basic ones, those that can be convincingly verified by proper tests and reliable calculations. For example, since plastic zone sizes *pz* depend on the dominant stress state around the crack tip, thus on the cracked piece thickness *t*, then the opening loads K_{op} and the effective stress intensity ranges ΔK_{eff}, which depend on *pz*, and thus the FCG rates too if controlled by ΔK_{eff}, should also depend on *t*; or overloads (OL) should affect much more the cracked component surfaces, hence FCG rate delays should be larger in thin pieces that work under predominantly plane stress conditions, than in thick ones where most of the crack front propagates under plane strain; or closure effects should be much more important at low than at high *R*-ratios; or else FCG is *R*-independent on truly inert environments. In the sequence some of these effects are verified by a series of carefully made experiments based on DIC optical techniques and on robust compliance measurements, specially designed to discriminate if they are really valid arguments or just wishful thinking. Finally, the predictions of the resultant crack front distortion expected during FCG when there is thickness or OL-induced gradients of the opening loads along it, made with 3D numerical models that can consider the influence of the local driving force along the crack fronts, are compared with fractographic evidence.

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