

A New Highly Flexible Curve Fit for Crack Growth Modeling

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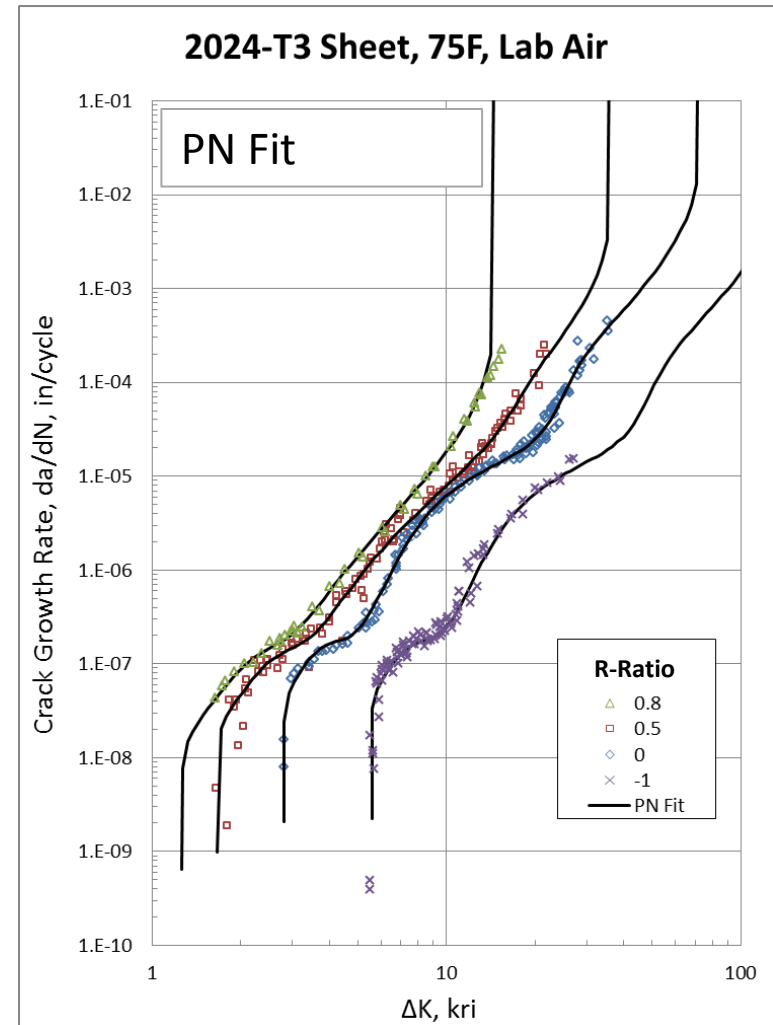
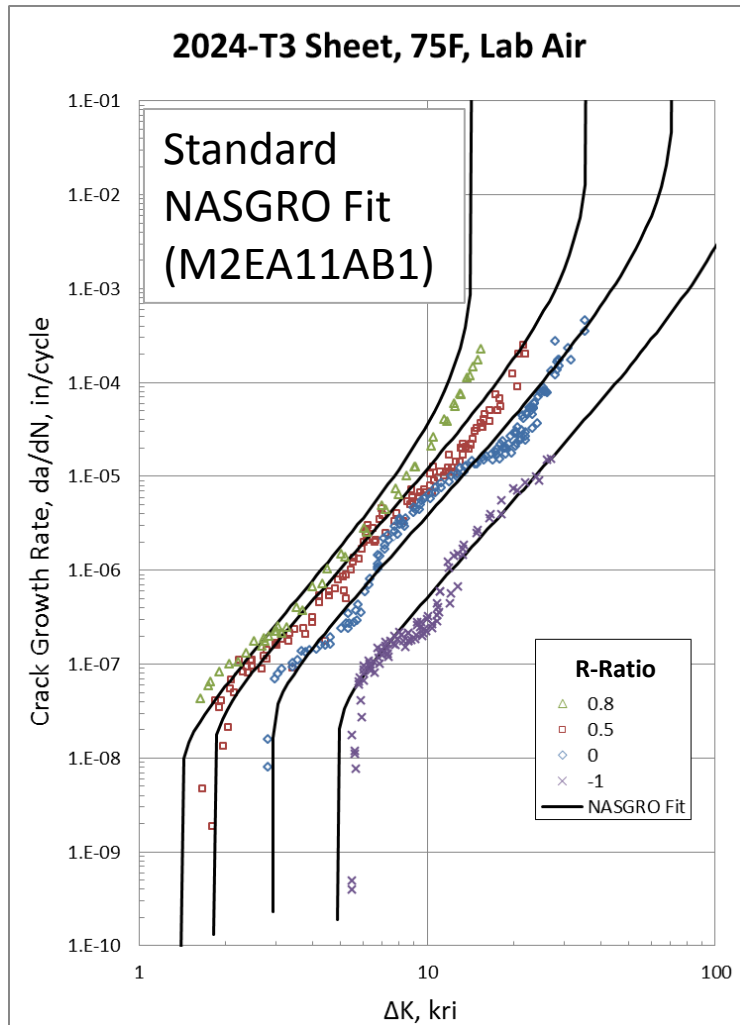
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The Problem

- Several shortcomings remain in commonly available options for fitting crack growth data
 - **Paris' Law** has evolved to the **NASGRO* equation**, which provides smoothing across R-ratios, and extends to threshold and toughness limits, but is restricted to linear log-log in Region II.
 - **Tabular input** can more accurately represent trends seen in test data, but the process of averaging and smoothing data is often ad hoc at best, and there is no smooth extrapolation to toughness and threshold limits as in the NASGRO equation.
- A standard smooth fit that can accommodate non-linear Region II behavior is needed.

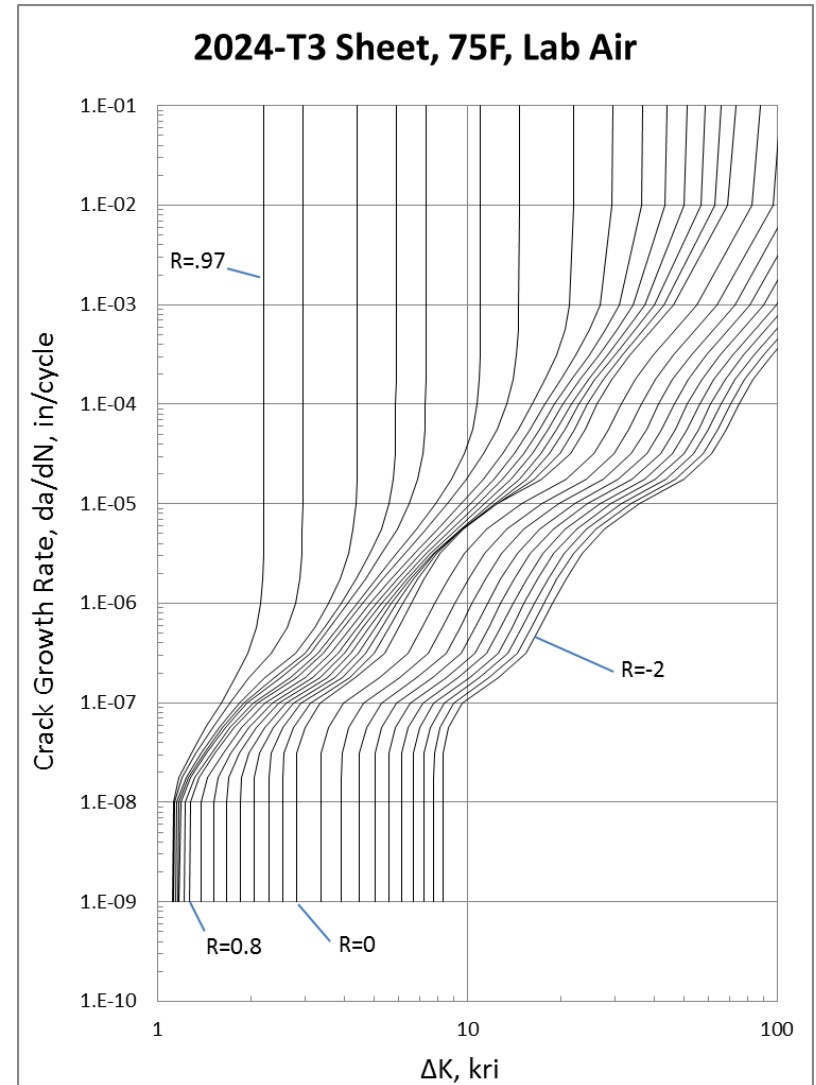
*NASGRO is a registered trade name of Southwest Research Institute

Solution: The PN Model Format



Extrapolation of 2024-T3 PN Model

- Fit extrapolation to high and low R appears smooth and reasonable



About the PN Fit

- Name indicates a perturbed variant of the NASGRO formulation (reverts to NASGRO equation as a special case)
- Smooth, flexible function throughout (not tabular)
- Region II nonlinearities integrated with closure correction
- Formulation not made public at this time
- FractureLab offers full service modeling using PN or other formulations, as well as laboratory services
 - Interim approach utilizes a PN fit to smooth data/extrapolate to limits; a refined tabular model is then created compatible with software of choice.

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