NON-RELAXING FATIGUE MODULE

FPM NR

Recommended for cases where cyclic minimum loading is greater than zero and material may strain crystallize

Test is run under a range of nonrelaxing (R > 0) conditions

Note: It is required to run FPM-C in order to run this Module.

Under nonrelaxing loads, some elastomers exhibit enhanced fatigue life / slowed crack growth due to strain crystallization effects. The effect is measured using crack arrest experiments in which a crack growing initially under fully relaxing loads is gradually operated under increasingly nonrelaxing loads. This information is required when constructing rubber's Haigh diagram for a crystallizing material.

Experiment Overview

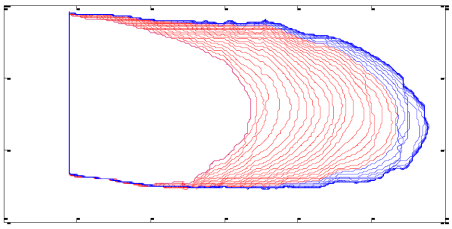
- fatigue crack growth arrest procedure with minimum strain sweep
- number of slabs needed for test: 1

Use with

- Mars-Fatemi Strain Crystallization Law
- X(R) Strain Crystallization Law

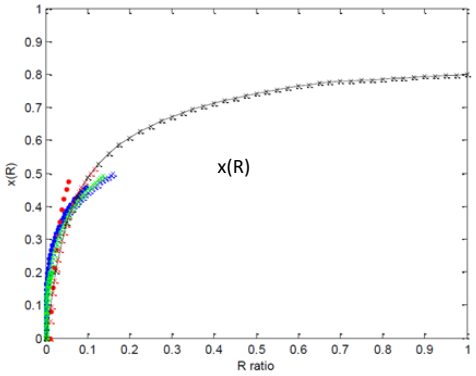
Analysis and Reporting / Deliverables

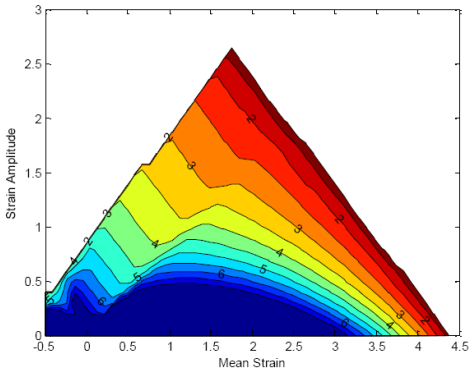
- crack arrest history c(N) for nonrelaxing cycles
- strain crystallization functions $F(R)$ and $x(R)$
- Haigh diagram showing sensitivity to minimum strain of crack nucleation life



At left, Crack tip images obtained during crack arrest experiments.
Red images show the crack tip while growing under fully relaxing conditions.
Blue images show the crack tip while growing under nonrelaxing conditions.

At right, Typical strain-crystallization function $x(R)$, showing dependence on the degree of nonrelaxation ratio R = Tmin / Tmax (where Tmin and Tmax are the energy release rate cycle extremes).





At left, Typical Haigh diagram for simple tension / compression loading, computed based on crack growth measurements and crack precursor size inferred from nucleation experiments. Contours are colored and labeled according to the base 10 logarithm of the fatigue crack nucleation life.

FPM-NR	**Non-Relaxing Fatigue Module at 23°C**	**$3,000**
Additional Option		
FPM-NR-TEMP	**Temperature Upcharge for non 23°C Non-Relaxing Module** Indicate temperature with range of -40°C to 150°C	**$850**