

Excerpt from NASGRO NASFORM manual (version 7.0 Alpha May 2012):

This section provides the theoretical background for the stress-life equations used in NASFORM. A comprehensive treatment of fatigue analysis and the underlying theory may be found in [1, 2]. The MIL-HDBK [3] gives an empirical equation fitted to stress-life data as follows:

$$\log N_f = A - B \log(S_{eq} - C) \quad (2.1)$$

where the equivalent stress is given by

$$S_{eq} = S_{\max}(1 - R)^P \quad (2.2)$$

with the usual definition of stress ratio

$$R = S_{\min} / S_{\max} \quad (2.3)$$

with S_{\min}, S_{\max} being the minimum and maximum stresses in a particular step of the spectrum block. The constants A, B, C, P are provided in the database. In addition, another constant L is used to define the equivalent stress below which life becomes greater than 10^8 cycles. Any stress below the value of L is assumed to cause no damage. For each of the materials, the values of R_{\min} and R_{\max} are also specified along with the above fitting constants. If the