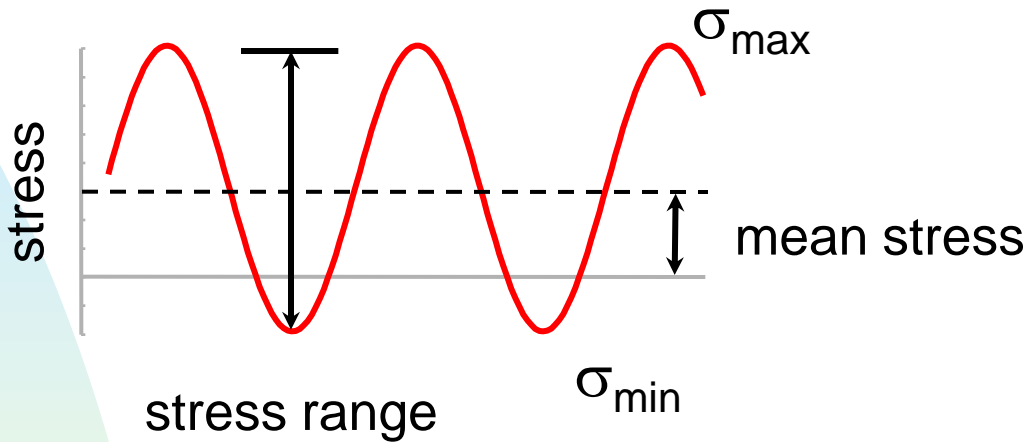


第24章 其它特性

多 S-N 平均应力曲线

- MSC.Fatigue V2005 允许用多平均应力曲线做疲劳分析, 这些曲线(考虑不同应力比 r 的)通过Goodman, Gerber或者其它经验方法考虑平均应力对S-N的影响.
- **在ASCII码材料库(.mnd)中实用, 代替标准材料库(.mdb)**

平均应力



$$\sigma_m = \frac{\sigma_{\max} + \sigma_{\min}}{2}$$

平均应力

$$R = \frac{\sigma_{\min}}{\sigma_{\max}}$$

平均应力比

R ratio

R>1

R=1

0<R<1

R=0

R=-1

R<0

R infinite

Loading condition

Smax and Smin 都是负的,负平均应力

静力载荷

Smax and Smin are 正的,

正平均应力

零对于拉载荷, Smin = 0

全交变载荷, 零平均应力

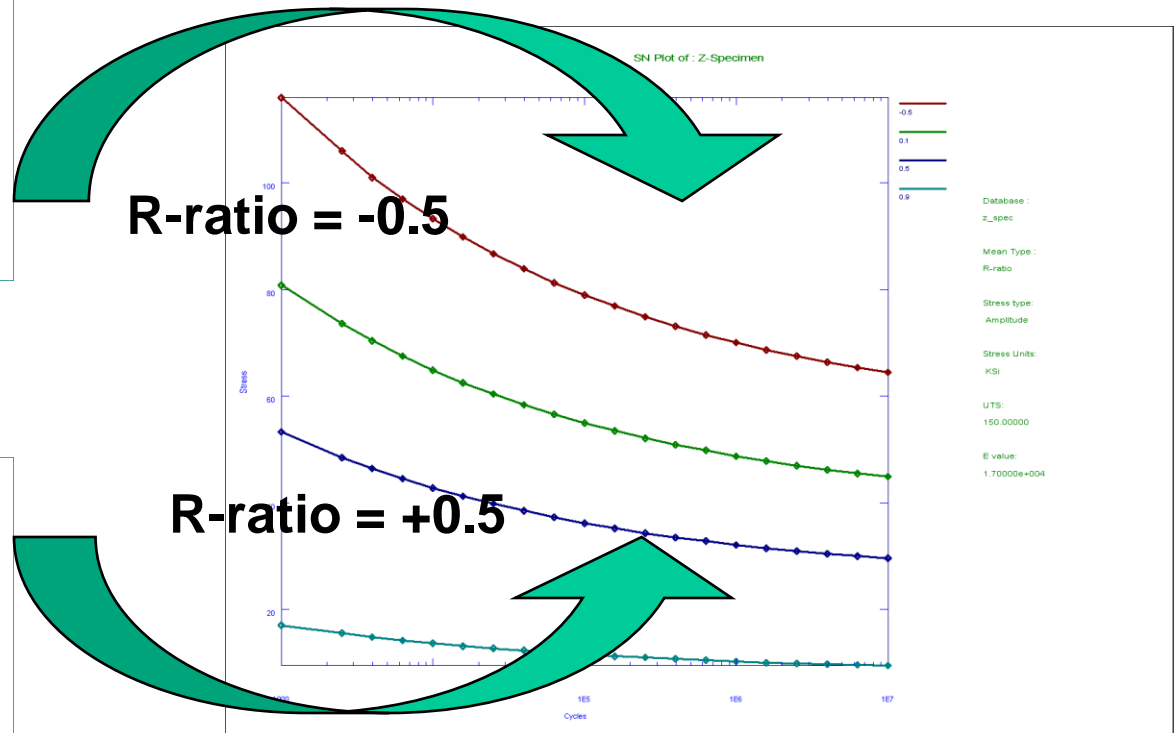
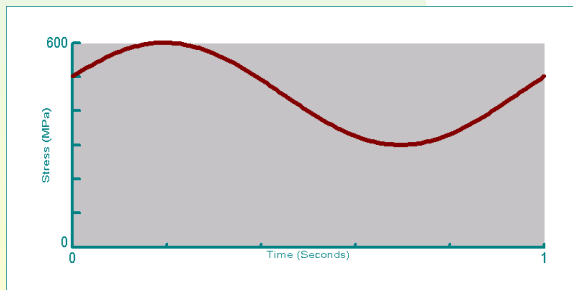
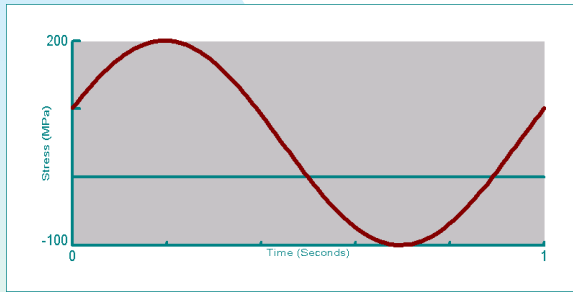
abs(Smax) < abs(Smin),

Smax 接近零

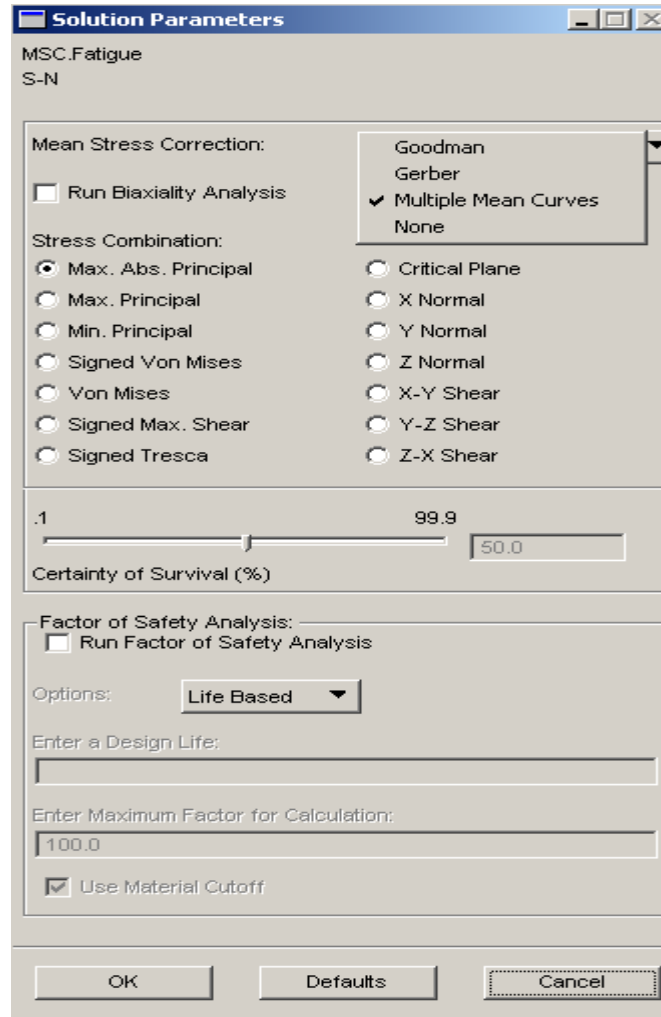
Smax = 0

使用多S-N曲线的平均应力

- 损伤从合适的s-n曲线计算,或者在曲线间插值



多S-N平均应力曲线



多S-N平均应力曲线

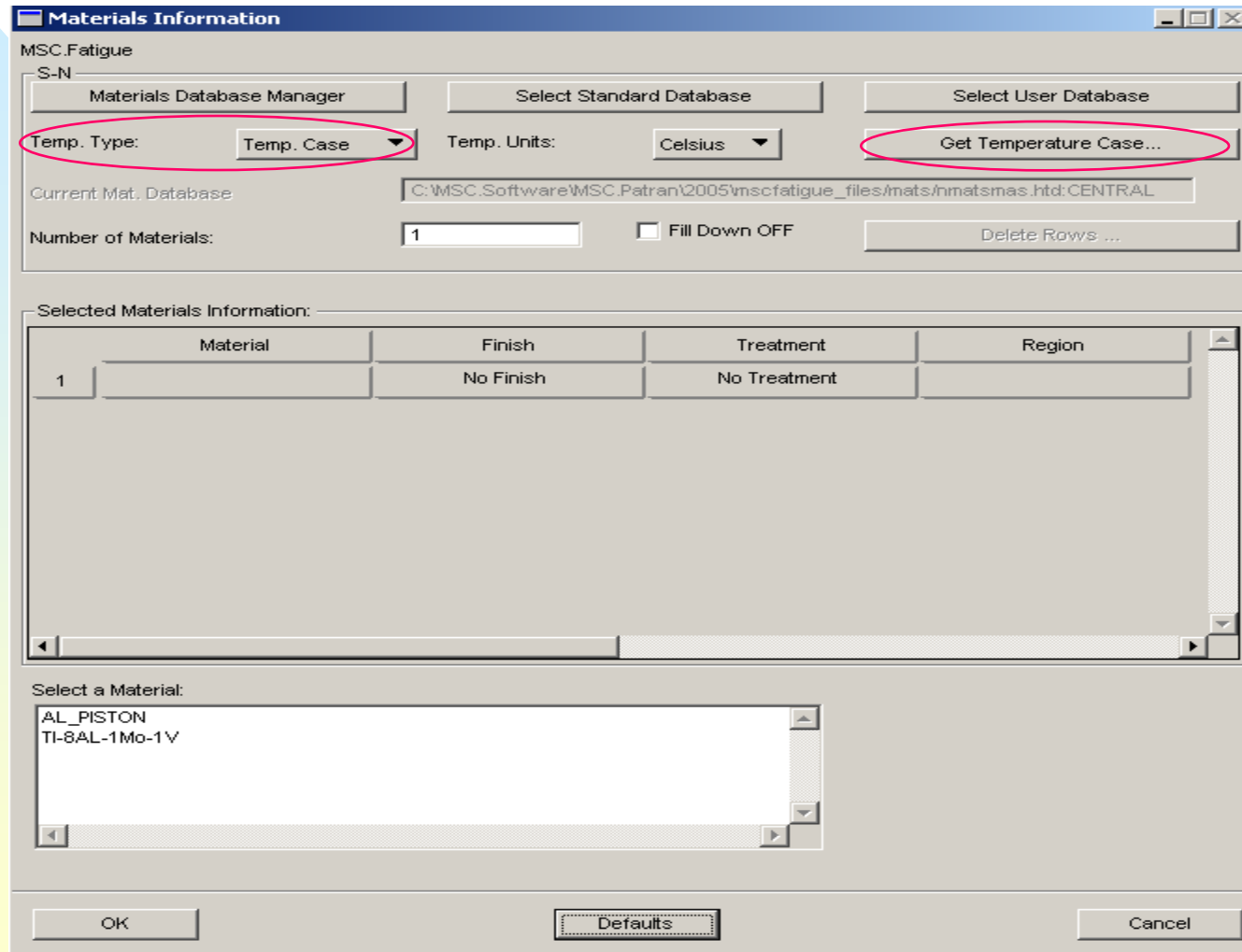
- 看快速开始手册第15章例子.
- 如果在不同平均应力的S-N曲线不存在,可以用在R=-1的S-N曲线去修正应力范围.有以下两种方法
 - ◆ **Goodman**
 - ◆ **Gerber**

温度修正疲劳

■ 温度修正

- ◆ 疲劳特性随稳定变化,特别是工作在高温的部件
- ◆ MSC.Fatigue V2005 用一个温度图去确定材料疲劳特性.
- ◆ 一组疲劳曲线去定义在不同温度的材料特性.
- ◆ 温度是稳态的 (也就是不随时间变化或者无蠕变)
- ◆ 温度随空间变化.
- ◆ 温度从标准FE模型或者ASCII表中读入.
- ◆ 查看快速开始手册第15章

温度修正疲劳



负载循环分析器

- **Duty Cycle** 使得我们可以考虑多事件时间表
- 每个事件有自己的循环数,损伤线性累积
- 载荷时间历程可以使**DAC,RPC**格式或者组合格式
- 可以观测各个事件的贡献
- 管理所有的疲劳分析运行和组合结果
- 看快速开始手册第**18**章

负载循环分析器

- 选择Duty Cycle :

Job Setup (in Loading Information Form)

The screenshot shows the 'Loading Information' dialog box for MSC.Fatigue. The title bar reads 'Loading Information'. The main content area is divided into several sections:

- MSC.Fatigue**: The software name.
- Equiv. Units:** A text box containing '1.0'.
- repeats of the loading =**: A text box containing '0.0'.
- Repeats**: A button.
- Results Parameters:** A section containing:
 - Results Type:** A dropdown menu set to 'Static'.
 - Results From:** A dropdown menu set to 'Database'.
 - Surface:** A dropdown menu set to 'Top'.
 - Strain Type:** A dropdown menu set to 'Tensor'.
- Job Setup for:** A dropdown menu set to 'Duty Cycle', which is highlighted by an orange arrow.
- Results Transformations:** A dropdown menu set to 'Transform to Basic'.
- Get Duty Cycle Information...:** A button at the bottom of the dialog.

负载循环作业设置

Duty Cycle Setup

Import Duty Cycle Setup Data...

Number of Sequences:

Sequence Information

	Sequence Name	Number of Repeats	Number of Events
1	wt1	1	3
2	wt2	2	4

Master Event Sequence Name:

Delete Selected Sequence

Event Information

	Event Name	Number of Repeats	Number of Time Histories
1	Push_Back	1	1
2	Taxi	1	1
3	Flight	2	1

Event Name:

Delete Selected Event Add Event

Fill Down OFF Delete Rows...

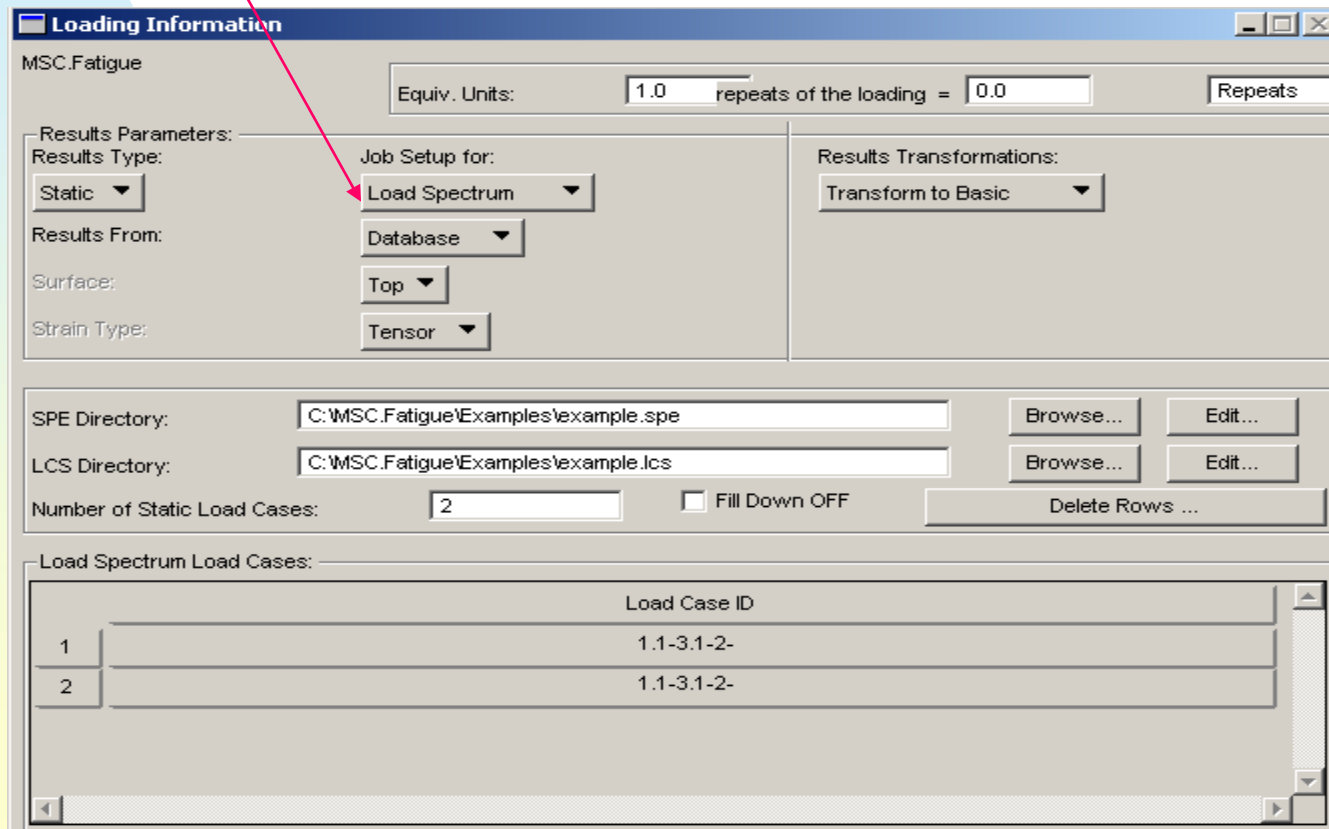
	Time History	Results Case	Normalizing Load	Scale Factor	Offset
1	Sine01.dac	1.1-3.1-	1.0	1.0	0.0

宇航谱文件支持

- 应力谱产生于可编辑的谱extension (.spe)和控制文件(extension .lcs)
- 查看快速开始手册第16章

宇航谱文件支持

- 从作业设置菜单调用载荷谱
(在载荷输入表)



MSC.Fatigue 文件

jobname.fin – patran写出的作业控制文件(ASCII),当我按下 apply 按钮在作业控制菜单,动作菜单有下面几个设置

: "Full Analysis", "Partial Analysis",
"Translate Only", "Save Job Only"..

jobname.fes – 疲劳求解输入文件(二进制)

modules. It contains information necessary to run a complete fatigue job. It is created by the Translator (PAT3FAT), which reads the file, *jobname.fin*, and the FEA results information (e.g. stresses) from the model database file (*model.db*). The "Full Analysis", or "Translate Only" Action on the Job Control Form will create this file.

jobname.fpp – 包含雨流计数结果的文件(后处理). The Action, "Partial Analysis", on the Job Control" Form will create all files upto this point, and stop.

jobname.fef – 疲劳分析结果文件(ASCII). It can be read into Patran to display the results. It is also used by the MSC.Fatigue Results module, PFPOST, to do tabular listing of Fatigue results.

jobname.fef_tmpl – 读入疲劳分析结果文件到patran的模板. This contains information defining the meaning of the various results data in the jobname.fef file.

jobname.msg – 疲劳分析的信息文件. 如果作业不能运行,可以查看这个文件,会提供线索.

jobname.sta – 状态文件 (ASCII), 可以通过作业运行监视器来读入,在分析过程中这个是时时更新的.

MSC.Fatigue 文件

jobname.asc	Fatigue Input file (ASCII)
jobname.crg	Crack Growth Results file
jobname.cyh	Cycle Distribution (histogram) at node/element n
*.dac	Load Time History file
jobname.dcl	Design Criteria-Life XY file
jobname.dyh	Damage Distribution (histogram) at node/element n
jobname.fal	Scale Factor-Life XY data file
jobname.fef	Fatigue Results (multi-node) file
jobname.fes	Fatigue Input file
jobname.fin	Job parameter file (ASCII)
jobname.fos	Factor of Safety Results file
jobname.fpp	Fatigue preprocessing Results file
jobname.kfl	Stress Concentration-Life XY file
*.ksn	K Solution file
jobname.msg	Fatigue Message file
jobname.sta	Job Status file
jobname.tcy	Crack Growth Analysis Time History file