

PCB Vibration Plus/ PCB Fatigue

EDA TechnoFair 2000

2000年1月27~28日

アンソフト・ジャパン株式会社



PCB Vibration Plus/ PCB Fatigue

は下記の機能を含みます。:

- 振動・疲労解析用プリプロセッサ
- 独立したリードハンダ接合部モデルとソルバ
- ソルバ: PCBと部品のリードハンダ接合部モデル
- スペクトラル・カーブと非線型材料ライブラリ

PCB Vibration Plus

境界条件 5 DOF; simple; fixed

The screenshot shows the PCB Vibration Plus software interface. The background displays a PCB layout with various components labeled U18, U19, U20, U61, U67, U66, U44, U50, U51, U52, U53, U54, U55, U56, U57, U58, U59, U60, U62, U63, U64, U65, U66, U67, U68, U69, U70, U71, U72, U73, U74, U75, U76, U77, U78, U79, U80, U81, U82, U83, U84, U85, U86, U87, U88, U89, U90, U91, U92, U93, U94, U95, U96, U97, U98, U99, U100. A modal dialog box is open in the foreground, displaying the following text:

```
Search String F-Search B-Search Save Text Exit
JOB: PCB_DEMO 16:58:24 09/15/99
***** BOUNDARY CONDITIONS *****
XC,YC= COORDINATES OF APPLICATION CENTER FOR AREA TYPE RECTANGLE AND CIRCLE
COORDINATES OF APPLICATION POINT FOR AREA TYPE POINT
COORDINATES OF ONE END POINT FOR AREA TYPE LINE
XS,YS= X AND Y SIZES OF APPLICATION AREA FOR AREA TYPE RECTANGLE AND CIRCLE
COORDINATES OF OTHER END POINT FOR AREA TYPE LINE
```

AREA TYPE	XC	YC	XS	YS	TX	TY	TZ	RX	RY
RECT	3.4000	0.1550	3.0600	0.3100	1	1	1	1	1
LINE	6.0000	1.0000	6.0000	4.9900	1	1	1	0	1
LINE	0.0000	1.0000	0.0000	4.0100	1	1	1	0	1

The dialog box also includes a table of boundary conditions for each area type, with columns for XC, YC, XS, YS, TX, TY, TZ, RX, and RY. The values are as shown in the table above.

On the right side of the interface, there is a vertical toolbar with buttons for MAIN, JOBPR, CPJOB, MESH, FORCE, AMASS, SPRNG, BCOND, RESULT, EXIT, and HELP. Below these are buttons for CMT, THR, UNM, FRC, PIN, MSS, PNM, SPR, CHT, BCD, MSH, STW, ELT, RSW, EDT, and GRD, RSP.

PCB Vibration Plus

部品モデル & PCBとの接続

Search String

P-Ceash

D-Ceash

Save Text

Quit

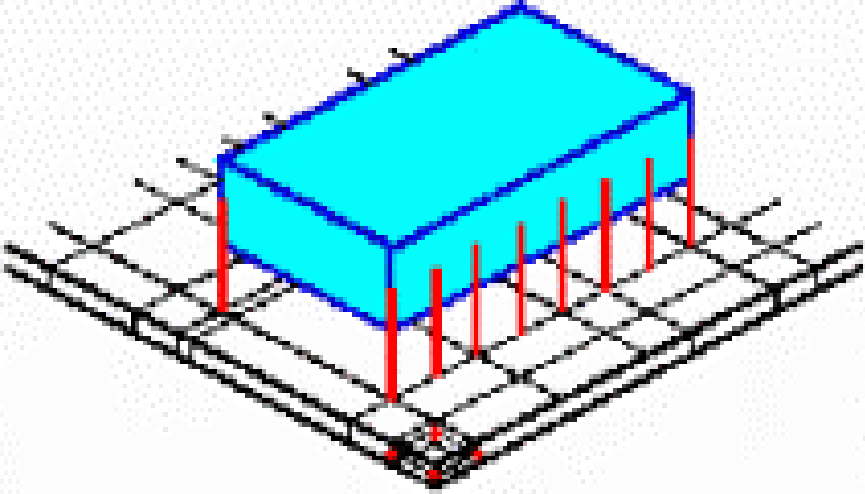
JOB: VP_DEM02 17:05:42 09/15/99

***** COMPONENT AND PIN INFORMATION *****

[U44]

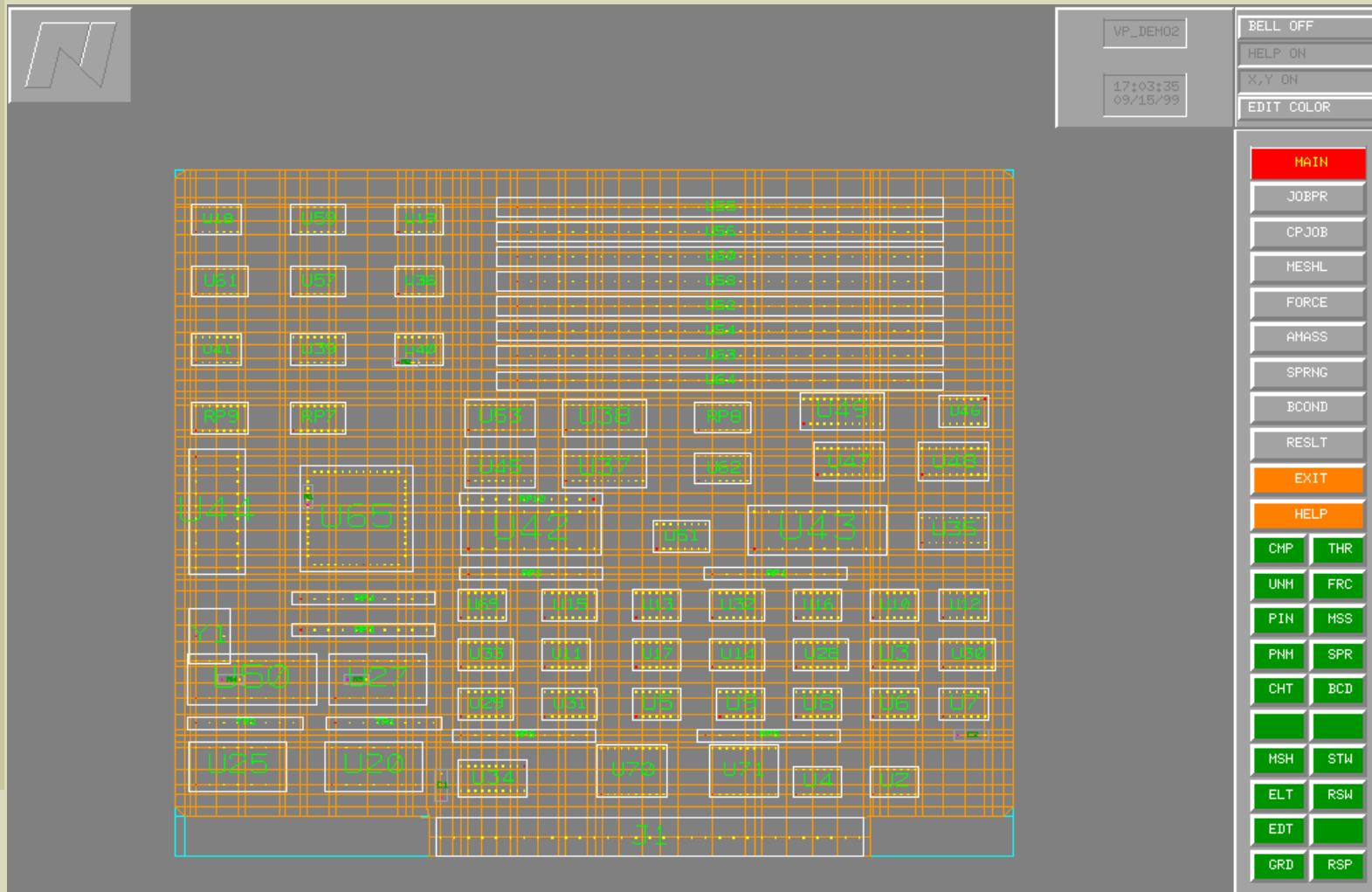
FUNCTIONAL TYPE: INTEGRATED CIRCUIT	PACKAGE NAME: DIP20_3
FUNCTIONAL NAME: 74LS373-1	PART NAME: 74LS373-1
CENTER LOCATION: 0.3000, 2.7750 in	MOUNT TYPE: SURFACE MOUNTED
SIDE & ROTATION: FRONT 0 DEG	MOUNT HEIGHT: 0.0100 in
SIZE: 0.4000, 1.0000, 0.1000 in	THIN OR RIGID: THIN PLATE
MASS: 1.2000E-02 Kg	EQV THICKNESS: 0.1000 in
COMPONENT BODY MATERIAL: PLASTIC-NOVOLAC	
DEFAULT LEAD : GWING1	

PIN	LOCAL COORDINATES		GLOBAL COORDINATES		LEAD MODEL	PIN/COMPONENT ROTATION
1	-0.1500	0.4500	0.1500	3.2250	DEFAULT LEAD	Default
2	-0.1500	0.3500	0.1500	3.1250	DEFAULT LEAD	Default



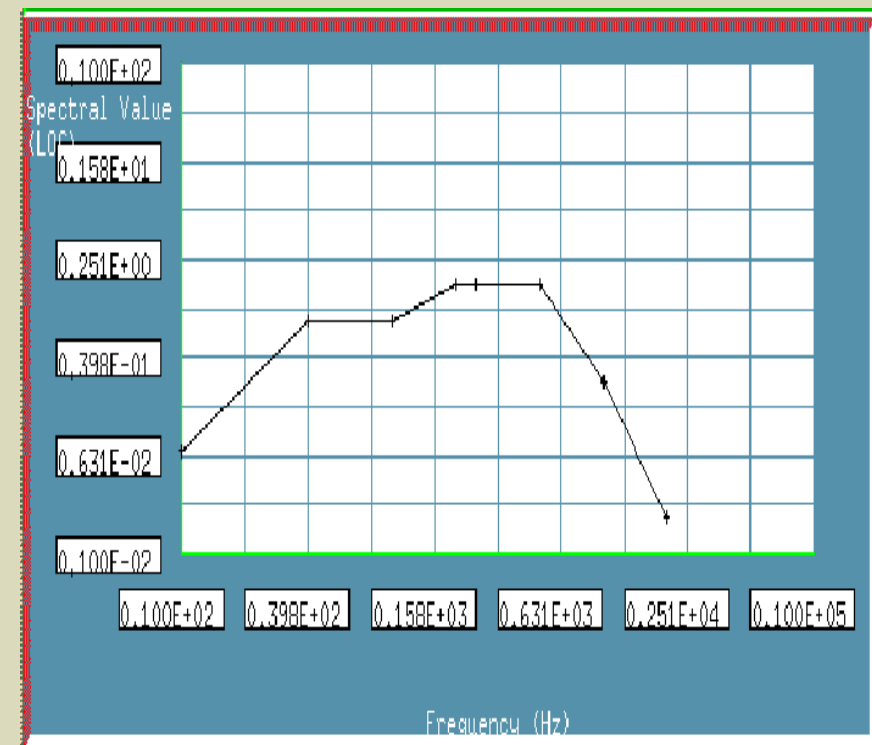
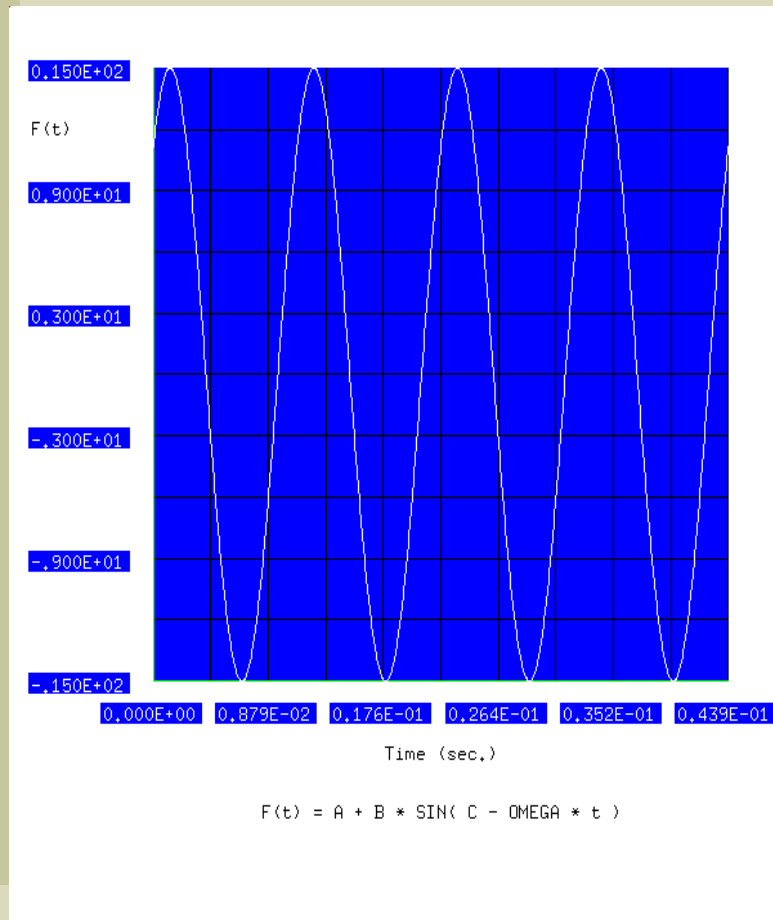
PCB Vibration Plus

PCB有限要素解析用メッシュ



PCB Vibration Plus

入力: タイム・ドメイン & スペクトラル



PCB Vibration Plus

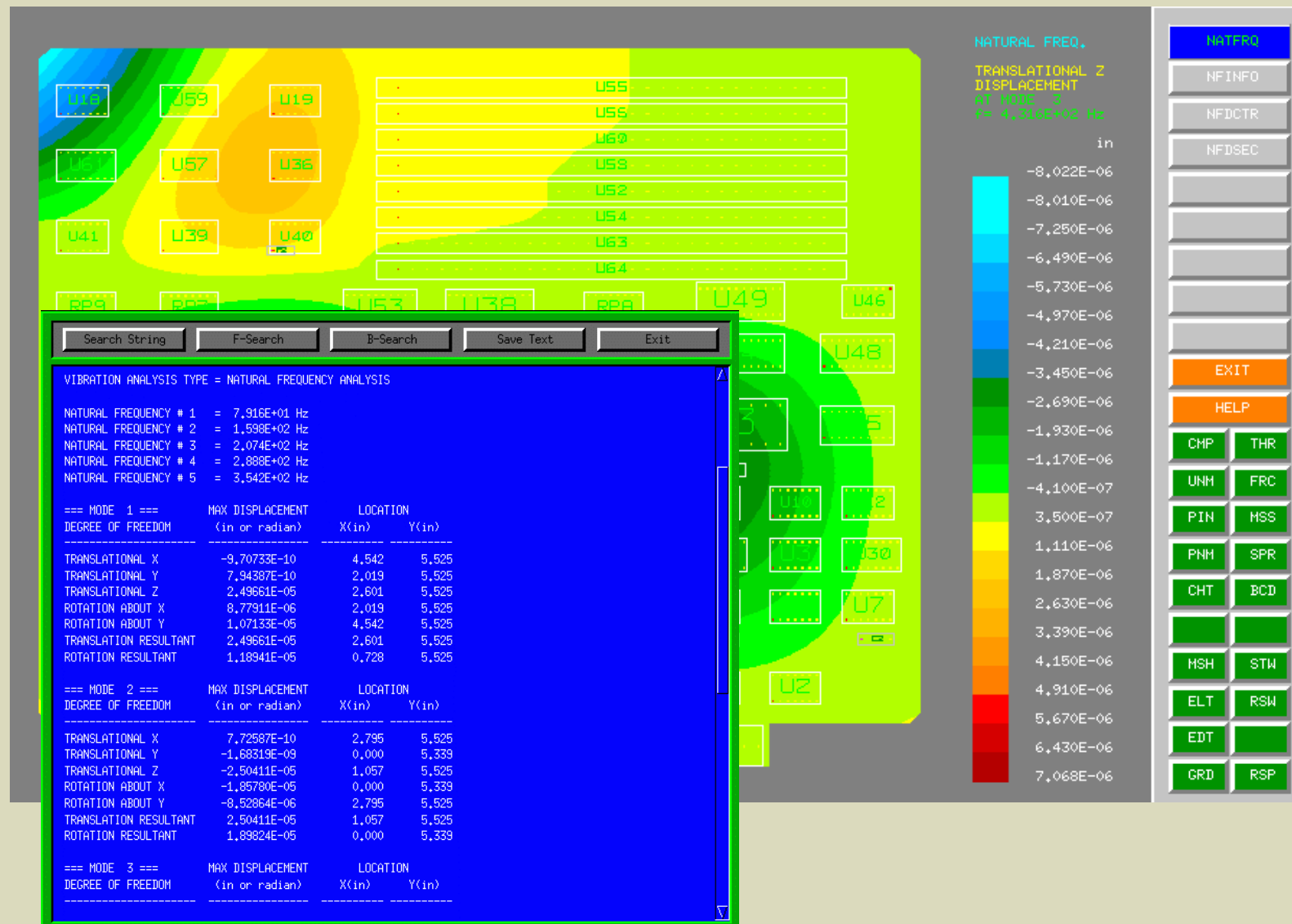
モデル解析パラメータ

Search String	F-Search	B-Search	Save Text	Exit
JOB: PCB_DEMO 16:50:37 09/15/99				
***** JOB PARAMETERS *****				
UNIT SYSTEMS				
11. GEOMETRY	=	0B		
12. ACCELERATION	=	g		
13. OTHERS	=	SI		
GRAPHICS DISPLAY				
21. GEOMETRIC DATA PRECISION	=	0.0100 in		
22. PIN DISPLAY SIZE	=	0.0050 in		
23. PANNING WINDOW (X)	=	50		
SUPPLEMENTAL LIBRARIES				
31. THERMAL COMPONENT LIBRARY	=	DEMO.LIB		
32. LINEAR MATERIAL LIBRARY	=	TUTORIAL.MLB		
33. TIME DEPENDENCY CURVE LIBRARY	=	HARMONIC.TDC		
34. LEAD/SOLDER JOINT LIBRARY	=	LEADS.LLB		
35. SPECTRUM CURVE LIBRARY	=	RANDOM.SPC		
DEFAULT NON-THERMAL COMPONENT DATA				
41. BODY HEIGHT	=	0.2000 in		
42. MOUNTING CLEARANCE (HEIGHT)	=	0.0100 in		
43. MASS DENSITY	=	1000.0000 Kg/m^3		
44. COMPONENT MASS: USE ALL VALID THERMAL COMPONENTS				
MASS AND STIFFNESS DAMPING CONSTANTS				
50. COMPONENT	MASS(1/sec)	STIFFNESS(sec)		
51. BOARD THICKNESS GROUP 1	0.00000000	0.00000000		

Search String	F-Search	B-Search	Save Text	Exit
110. ANALYSIS TYPE = RANDOM VIBRATION ANALYSIS				
400. NUMBER OF NATURAL FREQUENCIES = 5				
401. DAMPING COEFFICIENT AT MODE 1 = 0.02000000				
402. DAMPING COEFFICIENT AT MODE 2 = 0.02000000				
403. DAMPING COEFFICIENT AT MODE 3 = 0.02000000				
404. DAMPING COEFFICIENT AT MODE 4 = 0.02000000				
405. DAMPING COEFFICIENT AT MODE 5 = 0.02000000				
501. USE MODE 1 FOR THIS ANALYSIS? YES				
502. USE MODE 2 FOR THIS ANALYSIS? YES				
503. USE MODE 3 FOR THIS ANALYSIS? YES				
504. USE MODE 4 FOR THIS ANALYSIS? YES				
505. USE MODE 5 FOR THIS ANALYSIS? YES				
EXCITATION IN TRANSLATIONAL X DIRECTION				
611. EXCITATION TYPE = NONE				
EXCITATION IN TRANSLATIONAL Y DIRECTION				
621. EXCITATION TYPE = NONE				
EXCITATION IN TRANSLATIONAL Z DIRECTION				
631. EXCITATION TYPE = BASE ACCELERATION PSD				
632. SPECTRUM CURVE NAME = 12GRMS				
633. REFERENCE BASE ACCELERATION PSD = 1.0000E+00 g^2/Hz				
EXCITATION IN ROTATIONAL X DIRECTION				
641. EXCITATION TYPE = NONE				
EXCITATION IN ROTATIONAL Y DIRECTION				
651. EXCITATION TYPE = NONE				

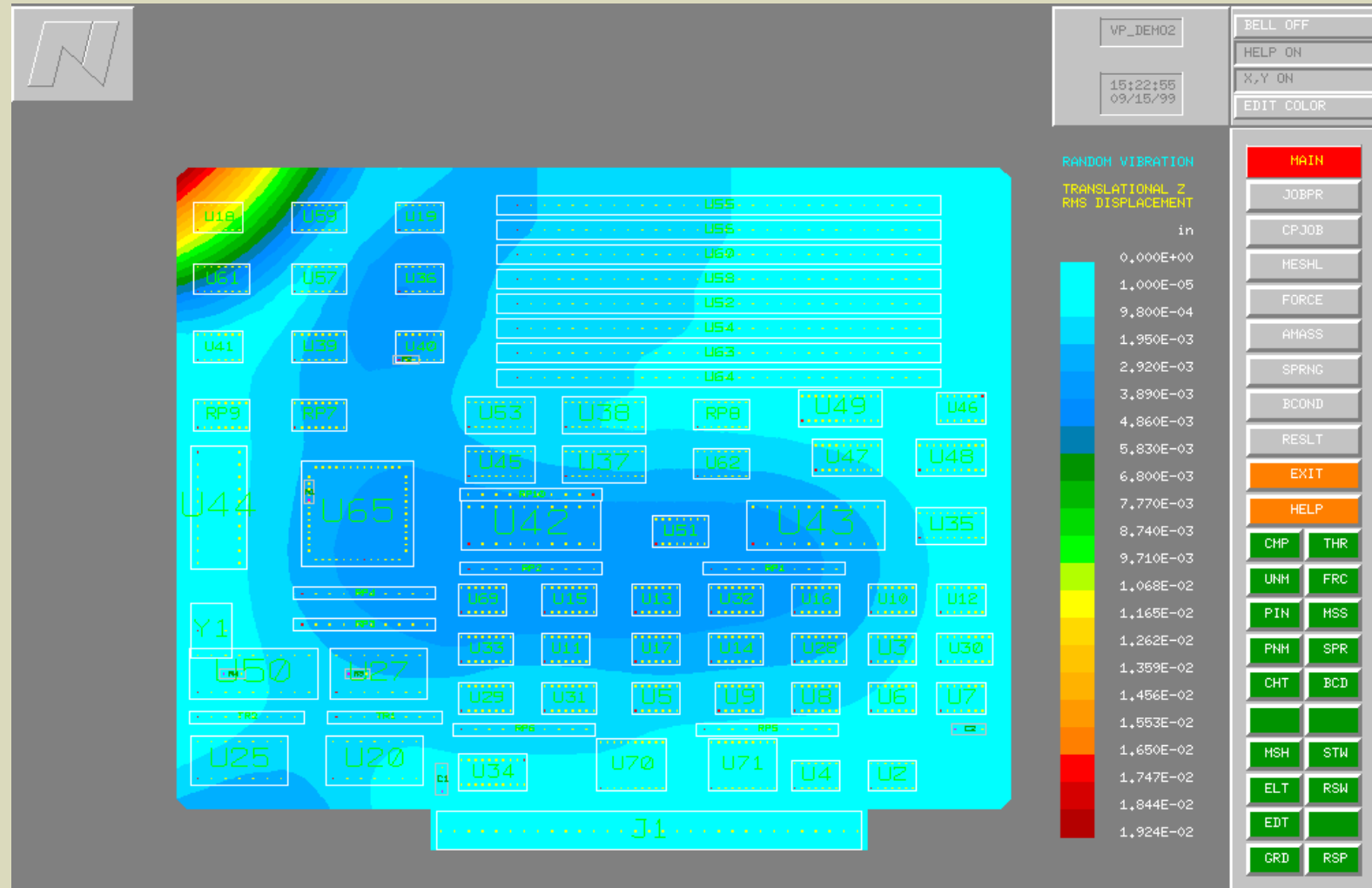
PCB Vibration Plus

固有振動数解析結果



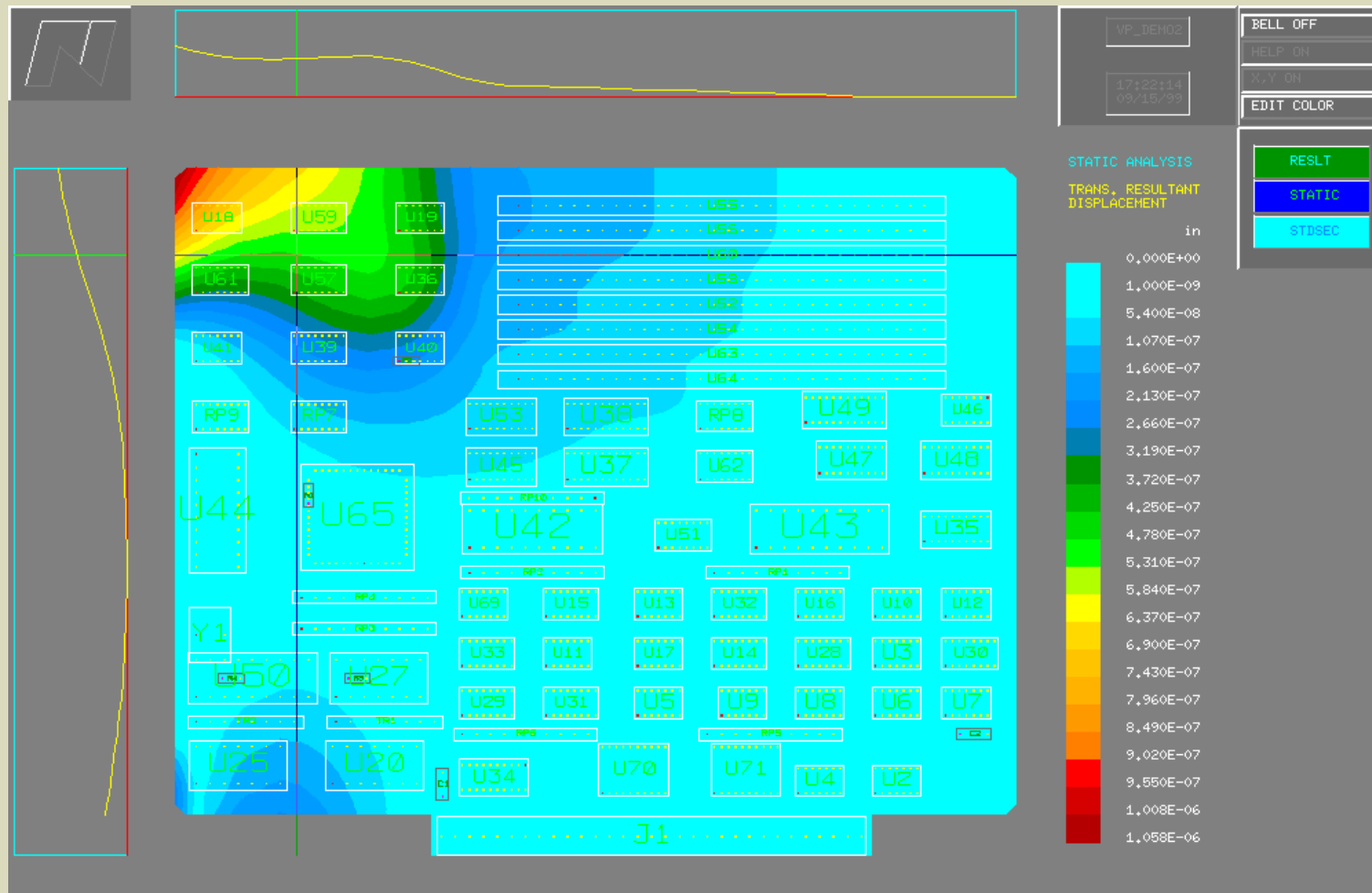
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ランダム振動応答



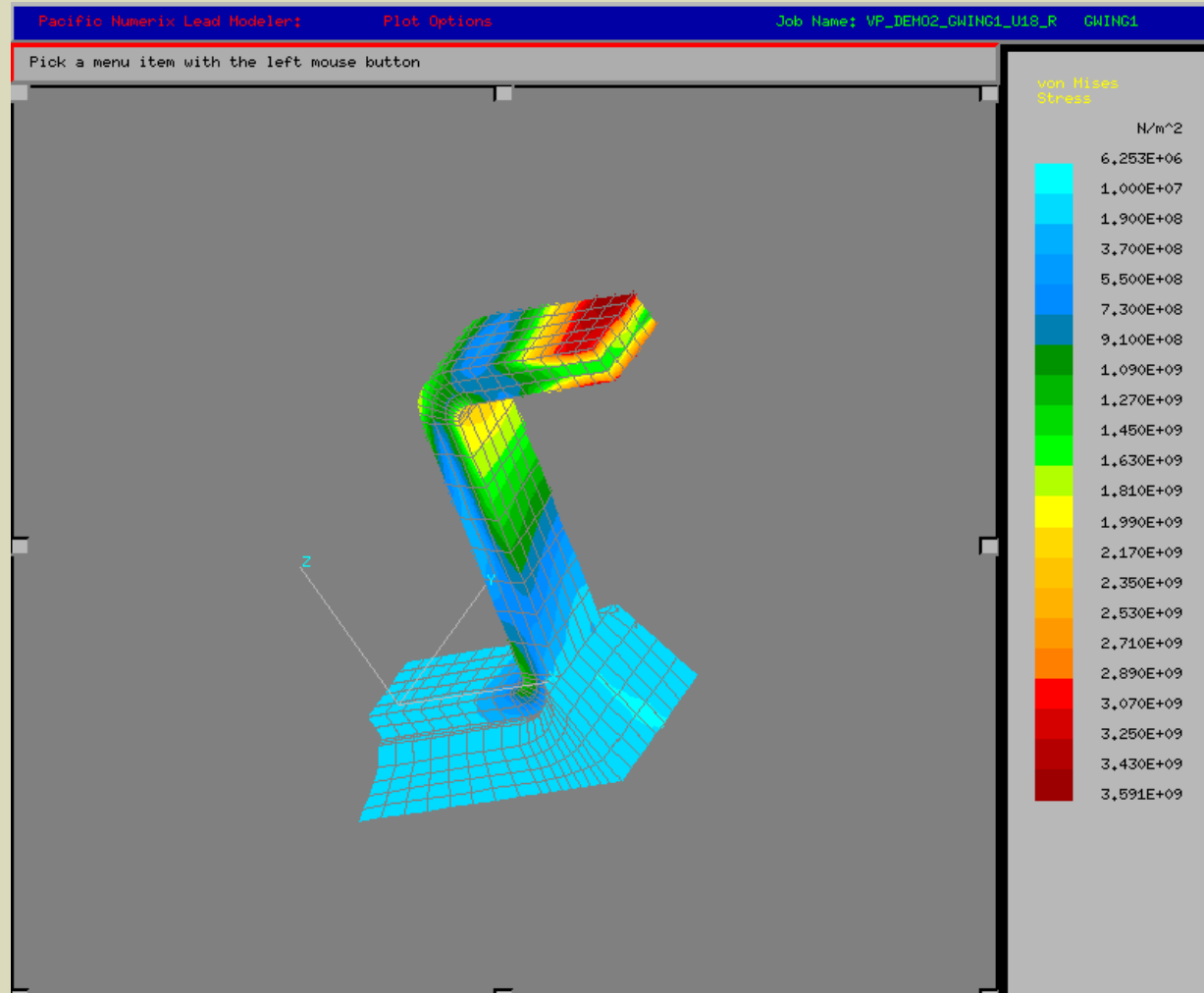
PCB Vibration Plus

静的ロード応答：コンタ図 とク
ロスセクション



PCB Vibration Plus/ PCB Fatigue

リードハンダ接合部 ストレス図



PCB Vibration Plus & PCB Fatigue の優位性

- 静的・衝撃負荷、ランダム振動、熱環境下でのPCBの変位を予測
- PCB組み立て時の最初の50固有振動数を確定
- 静的・衝撃負荷、ランダム振動、熱環境下の部品のリードハンダ接合部の変位を予測
- ランダム振動環境のための応答と周波数による変位と加速のトレードオフを予測
- 部品のリードハンダ接合部のストレスとPCBの変位に基づく最適な部品配置とパッケージタイプの決定
- 振動と熱の影響による部品のリードハンダ接合部の製品寿命と蓄積ストレスを計算する