

MSC/NASTRAN STATUS REPORT

(MARCH 1981)

- THE MOST RECENT NEW CAPABILITIES
- CURRENT PROJECTS
- LONGER RANGE PROJECTS
- SOME DETAILS OF NEW CAPABILITY

# THE MOST RECENT NEW CAPABILITIES

(VERSION 61)

- NEW COMPUTERS

- CRAY

- MAJOR NEW FUNCTIONAL CAPABILITIES

- MATERIAL NONLINEARITY

- LAYERED COMPOSITES

- TRIA6 ELEMENT

- VIEW-FACTORS FOR THERMAL RADIATION

- ADDITIONAL METHOD OF COMPONENT MODE SYNTHESIS

- DOCUMENTATION

- HANDBOOK FOR LINEAR STATIC ANALYSIS

CLASSIFICATION OF VERSION 61 MODIFICATIONS

NEW MAJOR CAPABILITY	5
NEW MINOR CAPABILITY	24
USER CONVENIENCE	24
IMPROVED EFFICIENCY	15
IMPROVED ACCURACY OR RELIABILITY	12
BETTER USE OF STORAGE	8
REMOVAL OF OLD CAPABILITY	9
OTHER	<u>8</u>
TOTAL RECORDED MODIFICATIONS	105

## SOME CURRENT PROJECTS

- NEW FUNCTIONAL CAPABILITY
  - MATERIAL NONLINEARITY
  - GRASP PRE/POSTPROCESSOR
  - STRESSES AT GRID POINTS
  - BETTER METHOD TO ENFORCE DISPLACEMENTS IN DYNAMICS
  - INERTIA RELIEF MODES
  - SUPERELEMENT TASKS
  
- DOCUMENTATION
  - HANDBOOK FOR DYNAMIC ANALYSIS
  - SUPERELEMENT HANDBOOK
  - NEW EDITION OF PROGRAMMER'S MANUAL

## LONGER RANGE PROJECTS

- IMPROVED RESTART LOGIC
- STRUCTURAL OPTIMIZATION

### FIRST STEP: DESIGN SENSITIVITY

- WORK STATION CONCEPT
- HANDBOOK FOR NONLINEAR ANALYSIS
- NEW THEORETICAL MANUAL (ELEMENTS AND ALGORITHMS)

THE DEVELOPMENT OF A MODERN  
NONLINEAR CAPABILITY IN MSC/NASTRAN

- NECESSARY PRECURSORS:
  - MORE EFFICIENT AND MORE FLEXIBLE ELEMENT ASSEMBLY: EMG AND EMA (1973 - 1976)
  - A MODERN ELEMENT LIBRARY: QUAD4, TRIA3, HEXA, PENTA (1975 - 1977)
  - DATA BASE TECHNOLOGY (1974 TO PRESENT)
  
- LARGE DISPLACEMENT GEOMETRIC NONLINEAR ANALYSIS (RELEASED 1978)
  - UPDATED LAGRANGIAN FORMULATION
  - FOLLOWER FORCES
  - MODIFIED NEWTON-RAPHSON ALGORITHM
  
- COMBINED MATERIAL AND GEOMETRIC NONLINEAR ANALYSIS (RELEASED 1981)

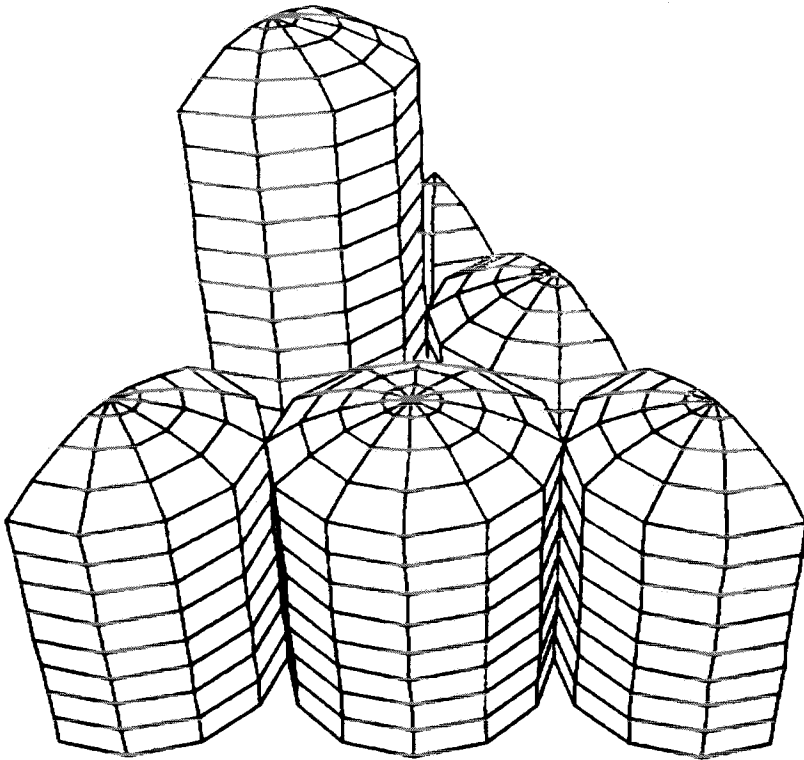
## NEW NONLINEAR CAPABILITY IN VERSION 61

- SØL 64 (OLD DMAP4) GEOMETRIC NONLINEARITY
  - SIMPLIFIED PROCEDURES; ERROR CORRECTIONS
  
- SØL 66 (NEW) COMBINED MATERIAL AND GEOMETRIC NONLINEARITY
  - TYPES OF MATERIAL NONLINEARITY
    - NONLINEAR ELASTICITY
  
    - PLASTICITY (WITH ELASTIC UNLOADING AND THE CHOICE OF SEVERAL THEORIES)
  
- NONLINEAR ELEMENTS
  - QUAD4, TRIA3 (MEMBRANE AND BENDING)
  
  - RØD, CØNRØD, TUBE
  
  - GAP (WITH SLIDING FRICTION)
  
  - BEAM (PLASTIC HINGES AT ENDS)
  
- NUMERICAL INTEGRATION
  - ISOLATION OF LINEAR AND NONLINEAR REGIONS
  
  - FULLY AUTOMATED MODIFIED NEWTON-RAPHSON METHOD
  
  - AUTOMATIC CONVERGENCE CRITERIA

NONLINEAR CAPABILITIES SCHEDULED FOR VERSION 62

- SOLID ELEMENTS
- TRANSIENT RESPONSE
- CREEP
- QUASI-NEWTON ITERATION
- PLANE STRAIN MATERIAL

HIDDEN SURFACES REMOVED



MSC/GRASP

10-MAR-81 16:15

TANK CLUSTER - NORMAL VIEW

