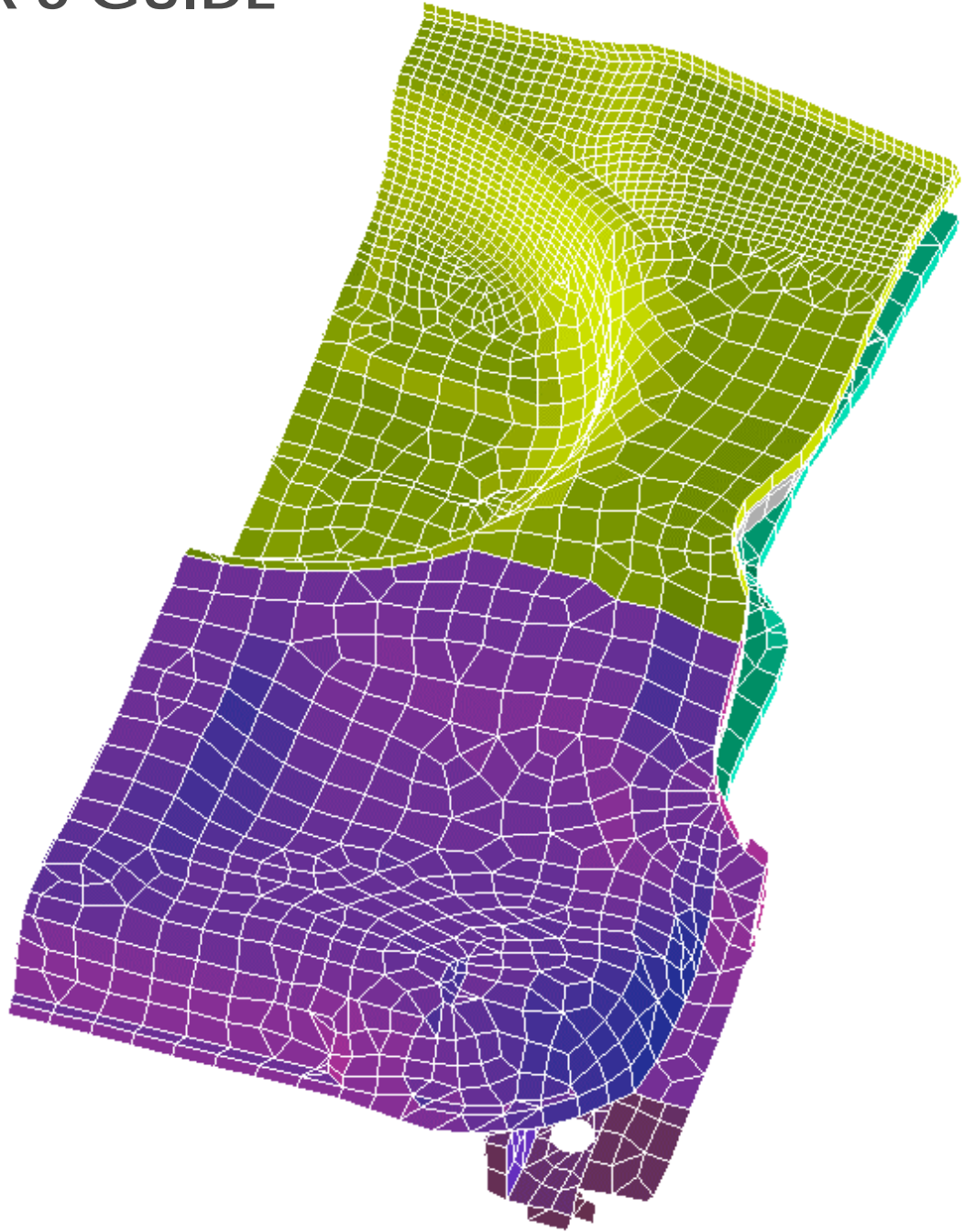


# MESHRED 1.0.23

## USER'S GUIDE



Lavatera LTD  
Kiev, Ukraine  
Email:  
[lavatera@lavatera.kiev.ua](mailto:lavatera@lavatera.kiev.ua)

CES Eckard GmbH  
Stuttgart, Germany  
Email:  
[info@ces-eckard.de](mailto:info@ces-eckard.de)

## INTRODUCTION

### MESHRED

is a program that allows you to remesh an initial finite element model (or part of this model) by creation a more wide (or more detailed) finite element mesh in defined regions. MESHRED can process the finite element model with multidomain complex structure containing 4- and 3-nodes shell (membrane) finite elements. MESHRED allows you to transfer loading, single point constraints (SPC) and rigid elements (RBE) of the initial finite element model into an output finite element model. Keeping of material properties and shell thickness for different parts of the model is also provided.

### Initial Model

is the NASTRAN bulk data file (or **initial data file**) containing the topology, geometry, loading, material properties, restrictions, etc. of the initial finite element model. MESHRED takes processes the following identifiers in the NASTRAN bulk data file:

- ◇ all rows with NASTRAN commands before "BEGIN BULK"
- ◇ CELAS2 bulk data entries
- ◇ CORD2R bulk data entries
- ◇ CQUAD4 bulk data entries
- ◇ CTRIA3 bulk data entries
- ◇ FORCE bulk data entries
- ◇ GRID bulk data entries
- ◇ MAT1 bulk data entries
- ◇ PARAM bulk data entries
- ◇ PLOTTEL bulk data entries
- ◇ PSHELL bulk data entries
- ◇ RBE2 bulk data entries
- ◇ SPC bulk data entries

Processing of the above bulk data entries will be described later. **MESHRED skips all other data in the initial data file.**

### MESHRED Commands

allows you to pick parts of the initial model for remeshing or erasing, create list of fixed nodes, initiate processing of coupling nodes in initial model and define properties of the new mesh. Each command has a prefix \$MESHRED, command name and list of values (or single value or none ). The valid commands for MESHRED are:

- ◇ \$MESHRED ERASEPID = integer[, integer, integer, ..., integer]
- ◇ \$MESHRED ERASECOORD = double, double, double, double, double, double
- ◇ \$MESHRED ACTIVPID = integer[, integer, integer, ..., integer]
- ◇ \$MESHRED ACTIVCOORD = double, double, double, double, double, double
- ◇ \$MESHRED FIXNODES = integer[, integer, integer, ..., integer]
- ◇ \$MESHRED COUPLTOLER = double
- ◇ \$MESHRED FACEANGLE = double
- ◇ \$MESHRED EDGEANGLE = double
- ◇ \$MESHRED WARPANGLE = double
- ◇ \$MESHRED DISTANGLE = double

- ◇ \$MESHRED GLOBALSIZE = double
- ◇ \$MESHRED GAPVALUE = double
- ◇ \$MESHRED RATIO = double
- ◇ \$MESHRED OPTTYPE = integer
- ◇ \$MESHRED NO\_RBE
- ◇ \$MESHRED NO\_LOAD
- ◇ \$MESHRED NO\_SPC
- ◇ \$MESHRED NO\_CP
- ◇ \$MESHRED NO\_CD
- ◇ \$MESHRED TRIA\_ONLY
- ◇ \$MESHRED DEBUG

All commands are placed into the MESHRED **control data file** in arbitrary order. Each command has to be in one row with not more than 80 characters. Some commands (with long list of values) may be placed in the control data file more than once. The resulting list of values for such commands is the union of all lists in the control data file.

### Output Model

- ◇ is the NASTRAN bulk data file with the topology, geometry, loading, material properties, restrictions, etc. of the output finite element model.
- ◇ is the data file in PERMAS format containing information about nodes coordinates, type and nodes of the output finite elements.

### Protocol File

is the ASCII file containing run-time messages from MESHRED. Each message contains time in HH:MM:SS format, sign of message's type and text, and numeric message's information.

There are the following message types:

- ◇ `**M=>` - information message only
- ◇ `**W=>` - warning message
- ◇ `**E=>` - error message, possible correction was executed, program not terminated
- ◇ `**F=>` - fatal error, termination of program execution

### Error Protocol File

is the ASCII file containing error and fatal error run-time messages from MESHRED only. Format of these messages is described above.

### Invoking of MESHRED:

```
>meshred <taskname>
```

For to start MESHRED in the current directory, two files must be present:

```
<taskname>.input - input data file
<taskname>.ctr - control data file
```

During the execution, MESHRED creates (in current directory) the following files:

```
<taskname>.nas - output NASTRAN bulk data file
<taskname>.dat - output PERMAS data file
<taskname>.pro - protocol file contain all messages
<taskname>.err - error protocol file contain the error and fatal error messages only
```

reg<number>.nas - NASTRAN bulk data files with information about regions, which are lost during remeshing. Each file of this type contains the topology and geometry of the initial region mesh and part of the the new mesh created until stop of the remeshing process.

## PRELIMINARY DEFINITIONS.

### Erase Area

is the part of the initial model, that should be erased. This means, that all elements of this area are will be not included into the active area and will not be copied into the output model. The erased area is defined by:

- ◇ \$MESHRED ERASEPID command(s)
- ◇ \$MESHRED ERASECOORD command

Non fixed nodes belonging to elements of the erased area only, are "erased" nodes. These nodes are not included into the output model. If fixed nodes belong to the erased area, a warning message is generated and this nodes will be copied into the output model (maybe as free node).

### Active Area

is the part of the initial model for which the new mesh should be created. Active area is defined by:

- ◇ \$MESHRED ACTIVPID command(s)
- ◇ \$MESHRED ACTIVCOORD command

Part of the active area overlapped by the erased area will erased.

### Kept Area

is the part of the initial model, which should be kept. This means, that elements of this area are not included into the active or erased areas and will be copied into the output model. All nodes of this area are fixed nodes.

### Fixed node

is a node with the same node ID, coordinates and other parameters in the GRID list of the input and output model. A node receives the status of a fixed node if:

- ◇ node ID is listed in "\$MESHRED FIXNODES" command(s)
- ◇ node GRID entry in the initial model has non blank CP and CP > 0 field and "\$MESHRED NO\_CP" command is not defined
- ◇ node GRID entry in the initial model has non blank CD and CD > 0 field and "\$MESHRED NO\_CD" command is not defined
- ◇ node ID is listed in SPC entries of the initial model and "\$MESHRED NO\_SPC" command is not defined
- ◇ node ID is listed in one or more RBE2 entries of the initial model and "\$MESHRED NO\_RBE" command is not defined
- ◇ node ID is listed in one or more FORCE entries of the initial model and "\$MESHRED NO\_LOAD" command is not defined
- ◇ node belongs to one or more CELAS2 elements in the initial model
- ◇ node belongs to one or more PLOTEL elements in the initial model
- ◇ line in through this node creates an angle equal or more than the angle defined by "\$MESHRED EDGEANGLE" command
- ◇ more than two lines intersect at this node
- ◇ this node is the end of line
- ◇ this node belongs to a kept area

All fixed nodes are the beginning or end of lines. There are no "free" fixed nodes.

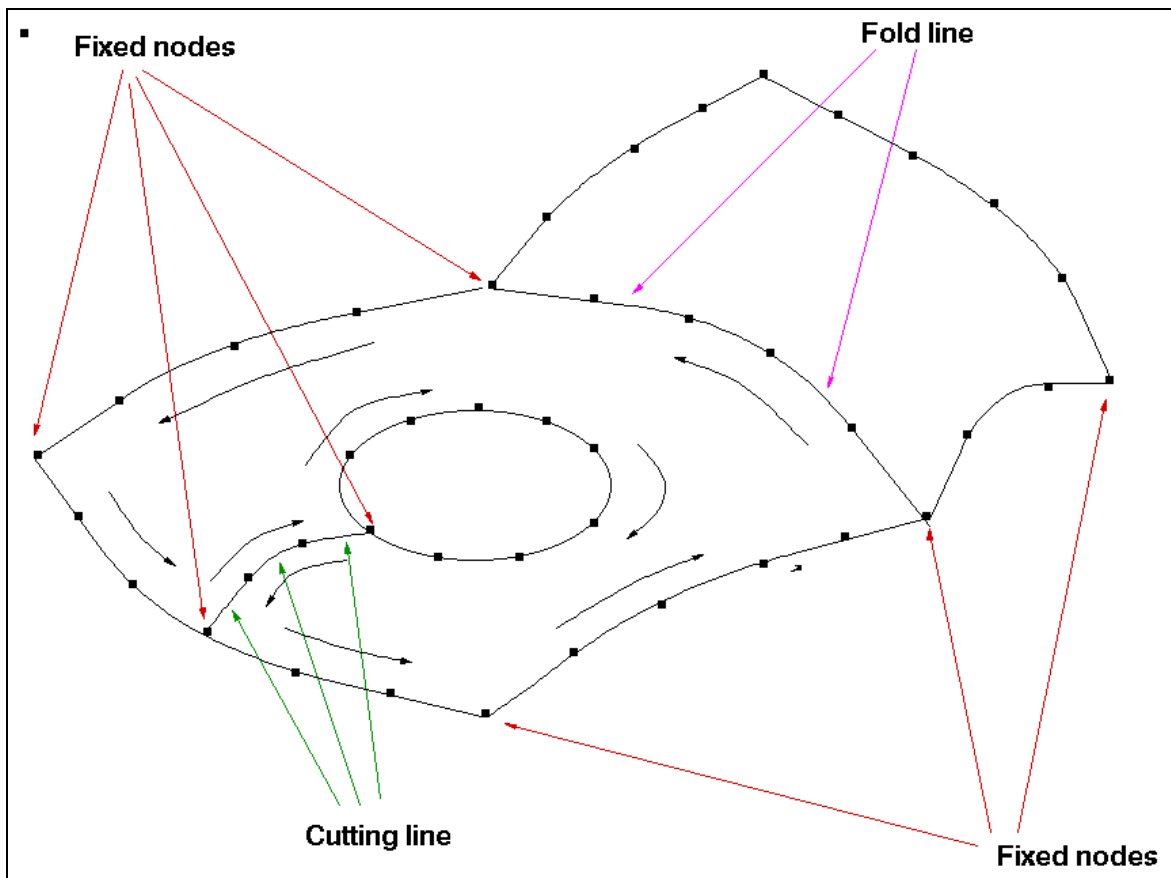


Fig. 1

### Line

is an oriented sequence of element edges between two fixed points. Lines are created

- ◇ to separate different parts of the initial model along PID boundaries, along boundaries between active and kept areas, etc.
- ◇ to mark geometrical peculiarities, such as fold lines (defined by the \$MESHRED EDGEANGLE command), etc.
- ◇ to mark element edges where more than two elements meet - branch lines.
- ◇ to mark free element edges - model boundary lines.
- ◇ to connect the outer and inner contours of a boundary - cutting lines.

Lines divide the initial model into regions.

### Boundary

is an oriented, closed sequence of lines outlining a region. For a region boundary, the mesh is created by dividing each line onto segments. The length of each segment is most possible closed to the element size defined by \$MESHRED GLOBALSIZE. Because the same lines are defining boundaries of neighbour regions, the mesh of the output model is topological correct.

### Region

is a set of elements of the initial model, outlined by the boundary of that. This set contains elements with identical PIDs for CTRIA3 or CQUAD4 in the input model.

The surface formed by the elements of this set is the surface for the new elements to be created. The regions are created for the active area only.

## MESHRED COMMANDS IN DETAIL

### \$MESHRED COUPLTOLER

#### Command format:

\$MESHRED COUPLTOLER = double

This command allows to couple nodes of the initial model, if the distance between these nodes are equal or less than the distance defined. After execution of coupling all elements in the initial model will be checked and transformed (if possible) or deleted (if necessary). That means that:

- ◇ CELAS2 elements with two equal nodes will be deleted from the model
- ◇ CQUAD4 element with two equal nodes will be transformed into CTRIA3 elements if possible or deleted from the model
- ◇ CTRIA3 element with two equal nodes will be deleted from model

\$MESHRED COUPLTOLER command can not be present in the control data file more than once.

**If \$MESHRED COUPLTOLER command is not presents in the control data file or distance defined is equal ZERO, coupling of nodes will not be executed.**

#### Example:

.....  
\$MESHRED COUPLTOLER = .00001

### \$MESHRED ERASEPID

#### Command format:

\$MESHRED ERASEPID = integer[, integer, integer,..., integer]

List of the integers after the equal sign define PID's of CTRIA3 or CQUAD4 entries in the input model. All elements with these listed PID's and nodes of these elements will receive an "erased" mark. Each "erased" element will be removed from the initial model. Each "erased" node will be removed from the initial model too, if this node is not marked as fixed before.

\$MESHRED ERASEPID command may be placed more than once in the control data file.

#### Example:

.....  
\$MESHRED ERASEPID = 2000,20010,800,400000,100  
.....  
\$MESHRED ERASEPID = 300000, 300,500,45000,700,5000,30020

Resulting list of PID to erase in example above will be the next:  
2000,20010,800,400000,100, 300000, 300,500,45000,700,5000,30020

## \$MESHRED ERASECOORD

### Command format:

\$MESHRED ERASECOORD = Xmin, Ymin, Zmin, Xmax, Ymax, Zmax

List of real numbers (Xmin, Ymin, Zmin, Xmax, Ymax, Zmax) define opposite vertices of an "erased box". All nodes of the initial model inside this "erased box" will be marked as "erased". Each element of the initial model defined by nothing then "erased" nodes, is an "erased" element. Each "erased" element will be removed from the initial model. Each "erased" node will be removed from the initial model too, if this node is not marked as fixed before.

Nodes are inside an „erased box“ if:

( Xmin <= X1 <= Xmax ) and

( Ymin <= X2 <= Ymax ) and ( Zmin <= X3 <= Zmax ).

\$MESHRED ERASECOORD command can not be present more than once in the control data file. **If \$MESHRED ERASECOORD and \$MESHRED ERASEPID commands are not present in the control data file, the "erase" action will not be executed.**

### Example:

.....

\$MESHRED ERASECOORD = -1000., -2.e2, -300, 1000., 100, 4.e+2

## \$MESHRED ACTIVPID

### Command format:

\$MESHRED ACTIVPID = integer[, integer, integer,..., integer]

List of integers after equal sign define PID's of CTRIA3 or CQUAD4 entries in the input model. All elements with these listed PID's will receive an "active" mark. Surfaces of "active" elements become the layout surfaces for the new mesh.

\$MESHRED ACTIVPID command may be placed in the control data file more than once.

### Example:

.....

\$MESHRED ACTIVPID = 2001,20011,801,400100,110

.....

\$MESHRED ACTIVPID = 30100, 3100,1500,45010,701,5100,31020

Resulting list of PID to mark as "active" in example above will be as follows:  
2001,20011,801,400100,110,30100, 3100,1500,45010,701,5100,31020

## **\$MESHRED ACTIVCOORD**

### **Command format:**

`$MESHRED ACTIVCOORD = Xmin, Ymin, Zmin, Xmax, Ymax, Zmax`

List of real numbers (Xmin, Ymin, Zmin, Xmax, Ymax, Zmax) define the opposite vertices of the "active box". All nodes of the initial model inside this "active box", will receive an "active" mark. Each element of the initial model with nothing than "active" nodes is an "active" element. Surfaces of "active" elements become the layout surfaces for the new mesh.

Nodes are inside the "active box" if:

( Xmin <= X1 <= Xmax ) and

( Ymin <= X2 <= Ymax ) and ( Zmin <= X3 <= Zmax ).

`$MESHRED ACTIVCOORD` command can not be present more than once in the control data file. **If `$MESHRED ACTIVCOORD` and `$MESHRED ACTIVPID` commands are not present in the control data file, the remeshing action will not be executed and the "nonerased" initial data will be copied into the output files.**

### **Example:**

.....

`$MESHRED ACTIVCOORD = -1000., -2.e2, -300, 1000., 100, 4.e+2`

## **\$MESHRED FIXNODES**

### **Command format:**

`$MESHRED FIXNODES = integer[ ,integer, integer,..., integer]`

List of integers after the equal sign define GRID ID's the of input model. All nodes with these listed ID's receive a "fixed" mark. Each "fixed" node will keep all its initial parameters during program execution.

`$MESHRED FIXNODES` command may be placed more than once in the control data file.

### **Example:**

.....

`$MESHRED FIXNODES = 1200,1201,1202,14002,14003`

.....

`$MESHRED FIXNODES = 17001,17002,17003,21001,21002`

Resulting list of ID to erase in example above will be the next:

1200,1201,1202,14002,14003,17001,17002,17003,21001,21002

## **\$MESHRED FACEANGLE**

### **Command format:**

\$MESHRED FACEANGLE = double

This command allows to define a threshold value (in deg) of an angle between normal vectors of neighbour elements to mark the edge between these elements as part of the fold line.

\$MESHRED FACEANGLE command can not be present more than once in the control data file. **If \$MESHRED FACEANGLE command will not be present in the control data file, the default value is accepted.**

### **Example:**

.....

\$MESHRED FACEANGLE = 12.0

## **\$MESHRED EDGEANGLE**

### **Command format:**

\$MESHRED EDGEANGLE = double

This command allows to define a threshold value (in deg) of an angle between line segments, to mark an point connecting these segments as "fixed" node.

\$MESHRED EDGEANGLE command can not present more than once in the control data file. **If \$MESHRED EDGEANGLE command will not be present in the control data file the default value is accepted.**

### **Example:**

.....

\$MESHRED EDGEANGLE = 20.0

## **\$MESHRED GLOBALSIZE**

### **Command format:**

\$MESHRED GLOBALSIZE = double

This command allows to define the preferable size of the new element edges.

### **Recomendation:**

The ratio of middle element size of initial model and GLOBALSIZE parameter value should not be exceeded 3.5.

\$MESHRED GLOBALSIZE command can not be present more than once in the control data file. **If \$MESHRED GLOBALSIZE command will not be presents in the control data file the default value is accepted.**

**Example:**

.....

\$MESHRED GLOBALSIZE = 35.0

## **\$MESHRED GAPVALUE**

### **Command format:**

\$MESHRED GAPVALUE = double

This command allows to define a relative gap width between elements edges/nodes created to be coupled without creating new additional elements.

### **Recomendation:**

Recommended value of this parameter is 0.15.

\$MESHRED GAPVALUE command can not be present more than once in control data file. **If \$MESHRED GAPVAUE command will not be presents in the control data file the default value is accepted.**

### **Example:**

.....  
\$MESHRED GAPVALUE = .145

## **\$MESHRED RATIO**

### **Command format:**

\$MESHRED RATIO = double

This command allows to define the possible ratio between element edges for the new elements. This parameter is used as restriction for the meshing algorithm and can not be achieved exactly. For most cases a suitable value of this parameter is 2.0.

\$MESHRED RATIO command can not present more than once in the control data file. **If \$MESHRED RATIO command will not be presents in the control data file the default value is accepted.**

### **Example:**

.....  
\$MESHRED RATIO = 2.5

## \$MESHRED DISTANGLE

### Command format:

\$MESHRED DISTANGLE = double

This command allows to define the initial allowed distortion angle (in deg) for new CQUAD4 elements. Distortion angle is defined as difference between maximal internal angle in CQUAD4 element and 90 degree. This parameter is used as restriction for meshing algorithm and can not be achieved exactly. For most cases suitable value of this parameter is 60 degree.

\$MESHRED DISTANGLE command can not present more than once in the control data file. **If \$MESHRED DISTANGLE command will not be present in the control data file the default value is accepted.**

### Example:

.....

\$MESHRED DISTANGLE = 40

## \$MESHRED WARPANGLE

### Command format:

\$MESHRED WARPANGLE = double

This command allows to define an acceptable warp angle (in deg) for new CQUAD4 elements. New CQUAD4 element with a warp angle more than defined, will be divided into two CTRIA3 elements.

\$MESHRED WARPANGLE command can not be present more than once in the control data file. **If \$MESHRED WARPANGLE command will not be present in the control data file the default value is accepted.**

### Example:

.....

\$MESHRED WARPANGLE = 40

## \$MESHRED OPTTYPE

### Command format:

\$MESHRED OPTTYPE = interger

This command allows to define an algorithm for smooting of the new mesh in the regions.

Smoothing iteration is executed to place each new node into a "middle" point on the layout-surface of the region.

This parameter value equal 1 means, that the "middle" point coordinates for current node calculated as average coordinates of nodes connected with current node by elements' edges in this region.

This parameter value more than 1 means that "middle" point coordinates for current node calculated as average coordinates of centers of gravity of elements containing current node weighted by elements square in power value/2.

For most cases suitable value of this parameter is 2. The value equals 3,4.. may be useful for creating more smooth mesh in regions where boundary mesh has big difference length segments.

\$MESHRED OPTTYPE command can not be present more than once in the control data file. **If \$MESHRED OPTTYPE command will not be present in the control data file the default value is accepted.**

### Example:

```
.....  
$MESHRED OPTTYPE = 2
```

## \$MESHRED NO\_RBE

### Command format:

\$MESHRED NO\_RBE

This command allows to skip all RBE2 entries in the initial data.

\$MESHRED NO\_RBE command can not present more than once in the control data file. **If \$MESHRED NO\_RBE command will not present in the control data file, RBE2 entries in the initial data file will not be skipped.**

### Example:

```
.....  
$MESHRED NO_RBE
```

## **\$MESHRED NO\_LOAD**

### **Command format:**

\$MESHRED NO\_LOAD

This command allows to skip all FORCE entries in the initial data.

\$MESHRED NO\_LOAD command can not present more than once in the control data file. **If \$MESHRED NO\_LOAD command will not be present in the control data file, FORCE entries in the initial data file will not be skipped.**

### **Example:**

.....

\$MESHRED NO\_LOAD

## **\$MESHRED NO\_SPC**

### **Command format:**

\$MESHRED NO\_SPC

This command allows to skip all SPC entries in the initial data.

\$MESHRED NO\_SPC command can not be present more than once in control data file. **If \$MESHRED NO\_SPC command will not be present in the control data file, SPC entries in the initial data file will not be skipped.**

### **Example:**

.....

\$MESHRED NO\_SPC

## **\$MESHRED NO\_CP**

### **Command format:**

\$MESHRED NO\_CP

This command allows to avoid influence of non blank CP fields and CP > 0 fields in GRID entries in initial data.

\$MESHRED NO\_CP command can not be present more than once in the control data file. **If \$MESHRED NO\_CP command will not be present in the control data file nodes with non blank CP field and CP > 0 field in GRID's entries in initial data file receives status of fixed nodes.**

### **Example:**

.....

\$MESHRED NO\_CP

## **\$MESHRED NO\_CD**

### **Command format:**

\$MESHRED NO\_CD

This command allows user to avoid influence of non blank CD fields and CD > 0 fields in GRID entries in initial data.

\$MESHRED NO\_CD command can not present in control data file more than once. **If \$MESHRED NO\_CD command not present in control data file nodes with non blank CD field and CD > 0 field in GRID's entries in initial data file receives status of fixed nodes.**

### **Example:**

.....

\$MESHRED NO\_CD

## **\$MESHRED TRIA\_ONLY**

### **Command format:**

\$MESHRED TRIA\_ONLY

This command forces the creation of CTRIA3 elements only in active area.

\$MESHRED TRIA\_ONLY command can not present in control data file more than once. **If \$MESHRED NO\_RBE command not present in control data file as CQUAD4 as CTRIA3 elements will created in active area.**

### **Example:**

.....

\$MESHRED TRIA\_ONLY

## \$MESHRED DEBUG

### Command format:

```
$MESHRED DEBUG
```

This command forces printout into protocol file more detail information about program execution and output information in NASTRAN format about regions for which meshing process was lost.

\$MESHRED DEBUG command can not present in control data file more than once.

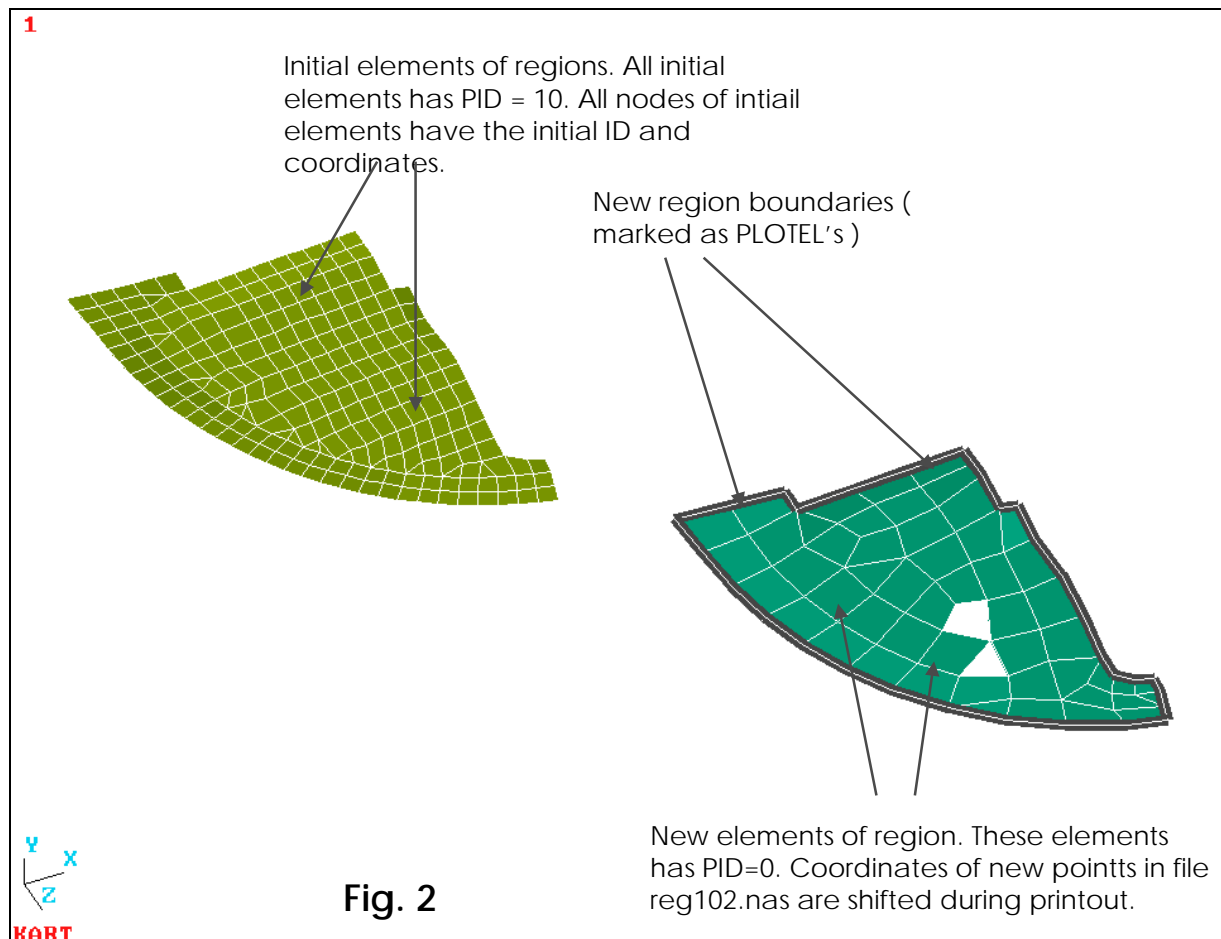
### Example:

```
.....  
$MESHRED DEBUG
```

Let's suppose the <taskname>.pro file contain the next messages:

```
15:21:30 *E => RGN >----- Region # 102 , part of PID = 10  
15:21:30 *E => RGN >----- is lost during remeshing  
15:21:30 *E => >-----Visual information is in file reg102.nas
```

In this case file reg102.nas contain the NASTRAN bulk data of model lost region and new elements of this region ( see the Fig. 2 ).



## OVERVIEW OF NASTRAN DATA ENTRIES PROCESSING.

### GRID

Entry format:

| 1    | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9    | 10 |
|------|----|----|----|----|----|----|----|------|----|
| GRID | ID | CP | x1 | x2 | x3 | CD | PS | SEID |    |

This entry may be read as in short (8 byte's length of each field) as in long format (16 byte's length of each field) formats. If CP or/and CD fields for current node are nonblank fields current node will marked as "fixed" node.

### CTRIA3

Entry format:

| 1      | 2   | 3   | 4  | 5  | 6  | 7     | 8     | 9 | 10 |
|--------|-----|-----|----|----|----|-------|-------|---|----|
| CTRIA3 | EID | PID | G1 | G2 | G3 | THETA | ZOFFS |   |    |
|        |     |     | T1 | T2 | T3 |       |       |   |    |

This entry may be read in short (8 byte's length of each field) format only. If PID field for current element is blank field this field will fill by EID value. Value in PID field serves to link with appropriate PSHELL entry. THETA, ZOFFS, T1, T2, and T3 fields not processed in current MESHRED version.

### CQUAD4

Entry format:

| 1      | 2   | 3   | 4  | 5  | 6  | 7  | 8     | 9     | 10 |
|--------|-----|-----|----|----|----|----|-------|-------|----|
| CQUAD4 | EID | PID | G1 | G2 | G3 | G4 | THETA | ZOFFS |    |
|        |     |     | T1 | T2 | T3 | T4 |       |       |    |

This entry may be read in short (8 byte's length of each field) format only. If PID field for current element is blank field this field will fill by EID value. Value in PID field serves to link with appropriate PSHELL entry. THETA, ZOFFS, T1, T2, T3, and T4 fields not processed in current MESHRED version.

### PLOTEL

Entry format:

| 1      | 2   | 3   | 4  | 5  | 6 | 7 | 8 | 9 | 10 |
|--------|-----|-----|----|----|---|---|---|---|----|
| PLOTEL | EID | PID | G1 | G2 |   |   |   |   |    |

This entry may be read in short (8 byte's length of each field) format only. Nodes with ID's marked in G1 and G2 fields will marked as "fixed" nodes. This entry has not another influence on processing and will copied into output model.

## CELAS2

### Entry format:

| 1      | 2   | 3 | 4  | 5  | 6  | 7  | 8  | 9 | 10 |
|--------|-----|---|----|----|----|----|----|---|----|
| CELAS2 | EID | K | G1 | C1 | G2 | C2 | GE | S |    |

This entry may be read in short (8 byte's length of each field) format only. Nodes with ID's marked in C1 and C2 fields will marked as "fixed" nodes. This entry has not another influence on processing and will copied into output model.

## CORD2R

### Entry format:

| 1      | 2   | 3 | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
|--------|-----|---|----|----|----|----|----|----|----|
| CORD2R | CID | G | A1 | A2 | A3 | B1 | B2 | B3 |    |

This entry may be read in short (8 byte's length of each field) format only. Entry data has not influence on processing and will copied into output model.

## FORCE

### Entry format:

| 1     | 2   | 3 | 4   | 5 | 6  | 7  | 8  | 9 | 10 |
|-------|-----|---|-----|---|----|----|----|---|----|
| FORCE | SID | G | CID | F | N1 | N2 | N3 |   |    |

This entry may be read in short (8 byte's length of each field) format only.

**IF \$MESHRED NO\_LOAD is defined:**

FORCE entry will skip.

**ELSE:**

Node with ID marked in G field will marked as "fixed" node. This entry has not another influence on processing and will copied into output model.

## MAT1

### Entry format:

| 1    | 2   | 3  | 4  | 5     | 6   | 7 | 8    | 9  | 10 |
|------|-----|----|----|-------|-----|---|------|----|----|
| MAT1 | MID | E  | G  | NU    | RHO | A | TREF | GE |    |
|      | ST  | SC | SS | MCSID |     |   |      |    |    |

This entry may be read in short (8 byte's length of each field) format only. Entry data has not influence on processing and will copied into output model.

## PSHELL

Entry format:

| 1      | 2   | 3    | 4    | 5    | 6      | 7    | 8    | 9   | 10 |
|--------|-----|------|------|------|--------|------|------|-----|----|
| PSHELL | PID | MID1 | T    | MID2 | 12I/T3 | MID3 | TS/T | NSM |    |
|        | Z1  | Z2   | MID4 |      |        |      |      |     |    |

This entry may be read in short (8 byte's length of each field) format only. Entry data has not influence on processing and will copied into output model.

## PARAM

Entry format:

| 1     | 2           |
|-------|-------------|
| PARAM | Text string |

This entry data has not influence on processing and will copied into output model.

## RBE2

Entry format:

| 1    | 2   | 3  | 4  | 5   | 6   | 7   | 8   | 9   | 10 |
|------|-----|----|----|-----|-----|-----|-----|-----|----|
| RBE2 | EID | GN | CM | GM1 | GM2 | GM3 | GM4 | GM5 |    |

This entry may be read in short (8 byte's length of each field) format only. Current MESHRED version support the single row RBE2 entry only.

**IF \$MESHRED NO\_RBE is defined:**

RBE2 entry will skip.

**ELSE:**

Node with ID's marked in GN, GM1, GM2, GM3, GM4, and GM5 fields will marked as "fixed" nodes. Entry data has not another influence on processing and will copied into output model.

## SPC

Entry format:

| 1   | 2   | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-----|-----|---|---|---|---|---|---|---|----|
| SPC | SID | G | C | D | G | C | D |   |    |

This entry may be read in short (8 byte's length of each field) format only.

**IF \$MESHRED NO\_SPC is defined:**

SPC entry will skip.

**ELSE:**

Node with ID's marked in G's fields will marked as "fixed" nodes. Entry data has not another influence on processing and will copied into output model.

## EXAMPLE.

The model shown on Fig 3 -4 was remeshed using the next control data file:

```
$MESHRED ACTIVCOORD = -35000,-35000,-35000, 4600,70000,40000  
$MESHRED ACTIVPID = 2  
$MESHRED FIXNODES = 231,290,365,1501,1592  
$MESHRED FACEANGLE = 25  
$MESHRED EDGEANGLE = 12  
$MESHRED WARPANGLE = 60  
$MESHRED DISTANGLE = 60  
$MESHRED GLOBALSIZE = 45  
$MESHRED GAPVALUE = .15  
$MESHRED RATIO = 2.5  
$MESHRED COUPLTOLER = .005  
$MESHRED OPTTYPE = 2  
#$MESHRED TRIA_ONLY
```

Size of elements' edges of initial model are ranged from 10mm to 16 mm. The result of remeshing is shown on Fig. 5-6 and Fig.7-8 (with \$MESHRED TRIA\_ONLY included in control data file).

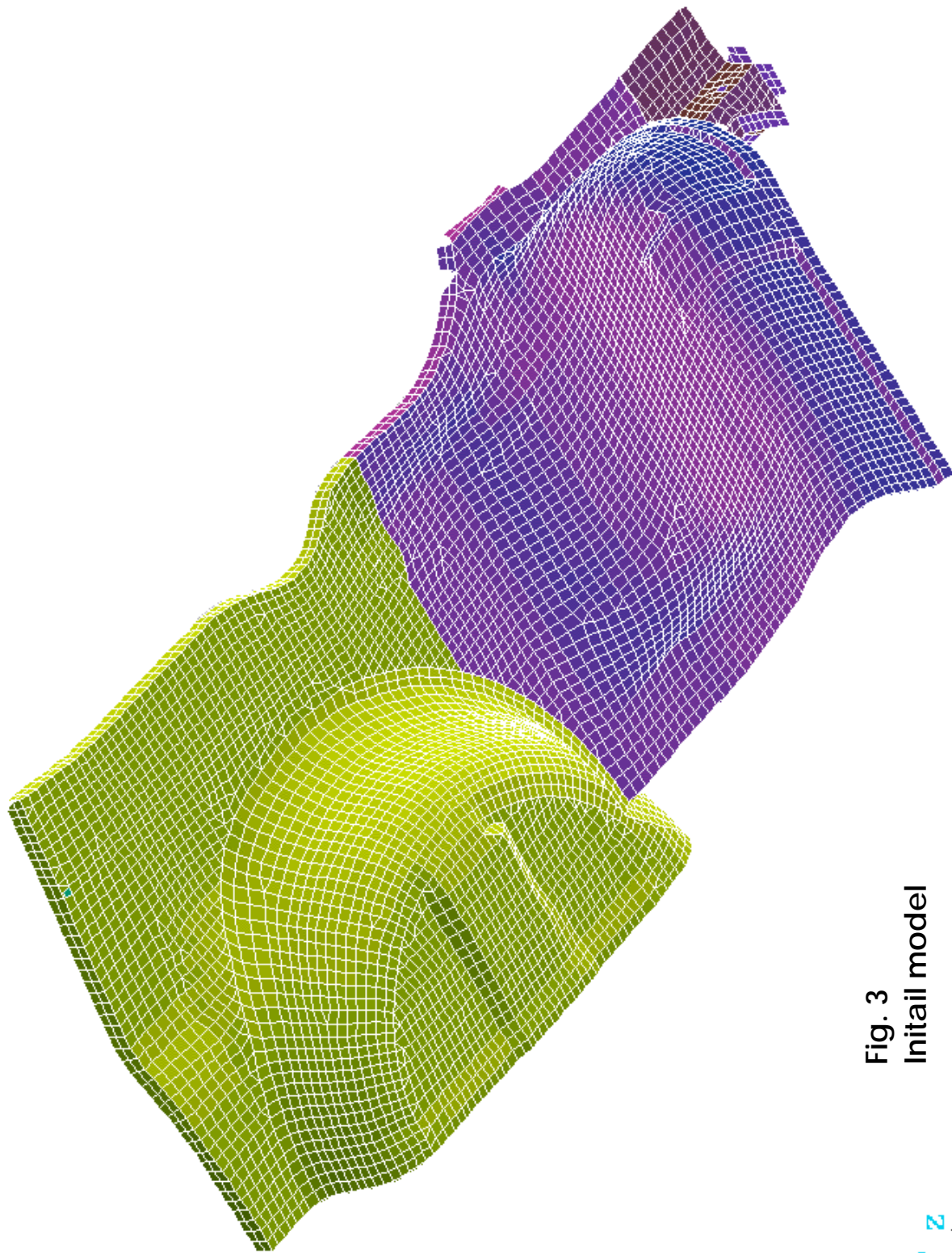


Fig. 3  
Initail model



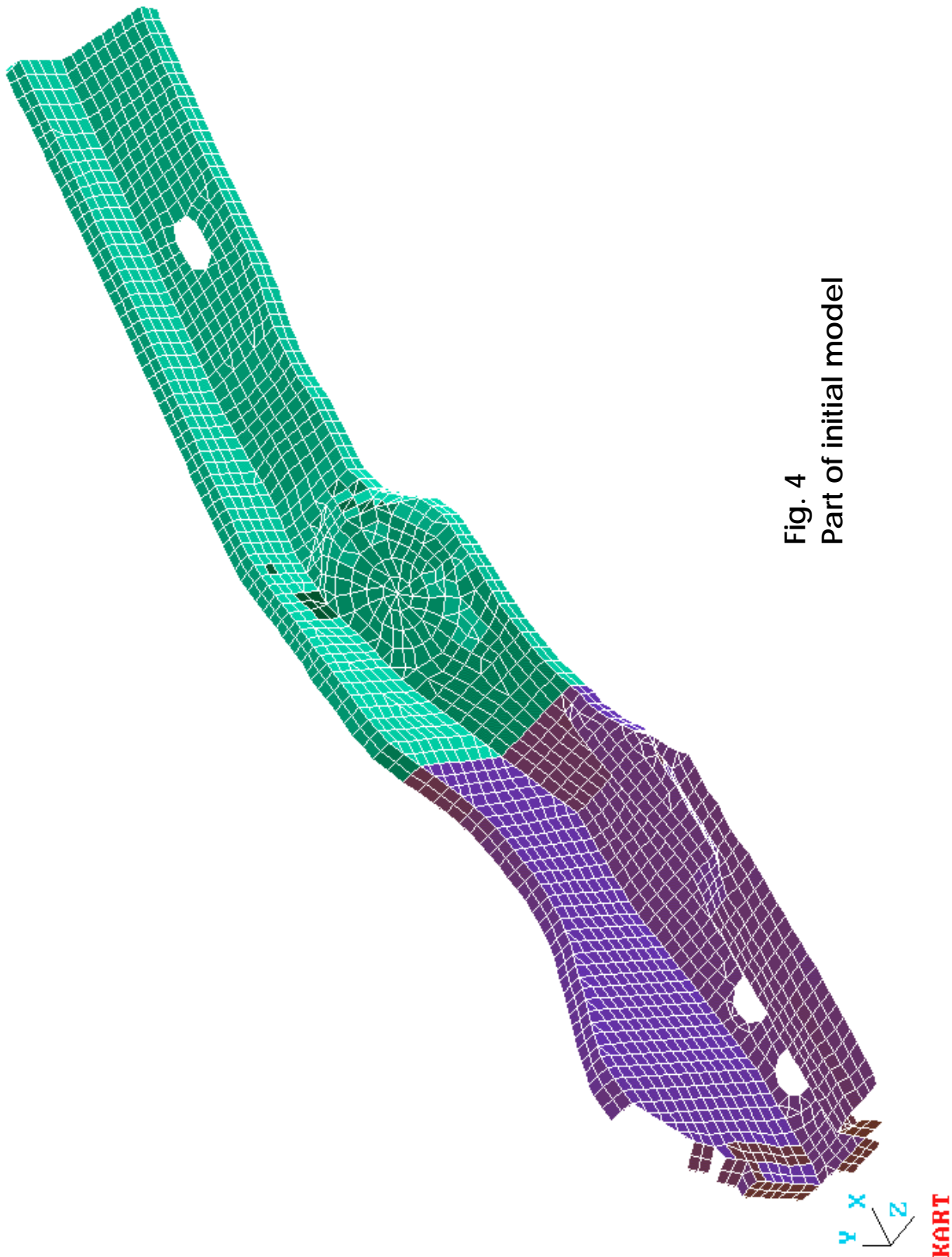


Fig. 4  
Part of initial model

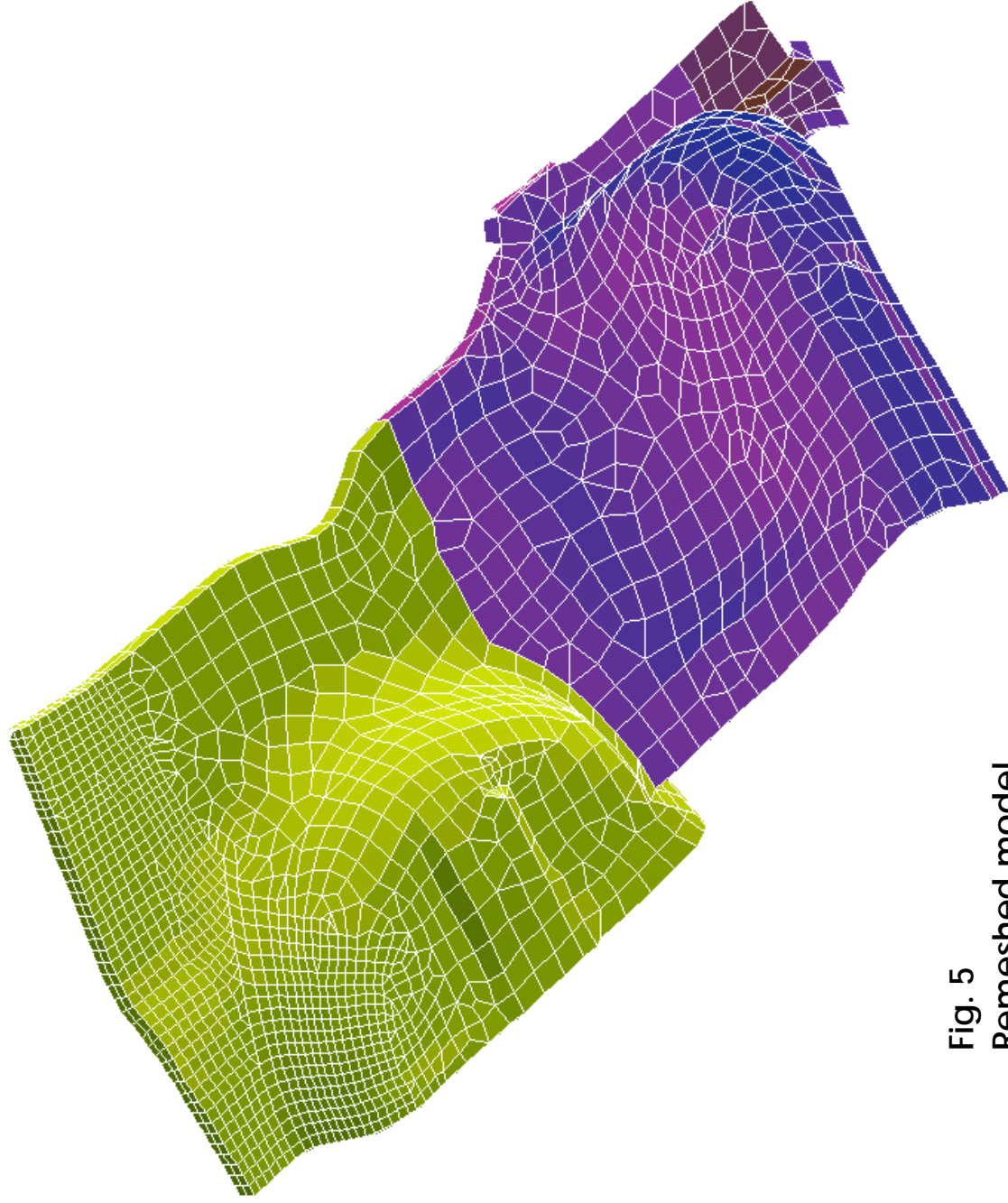


Fig. 5  
Remeshed model



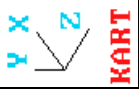
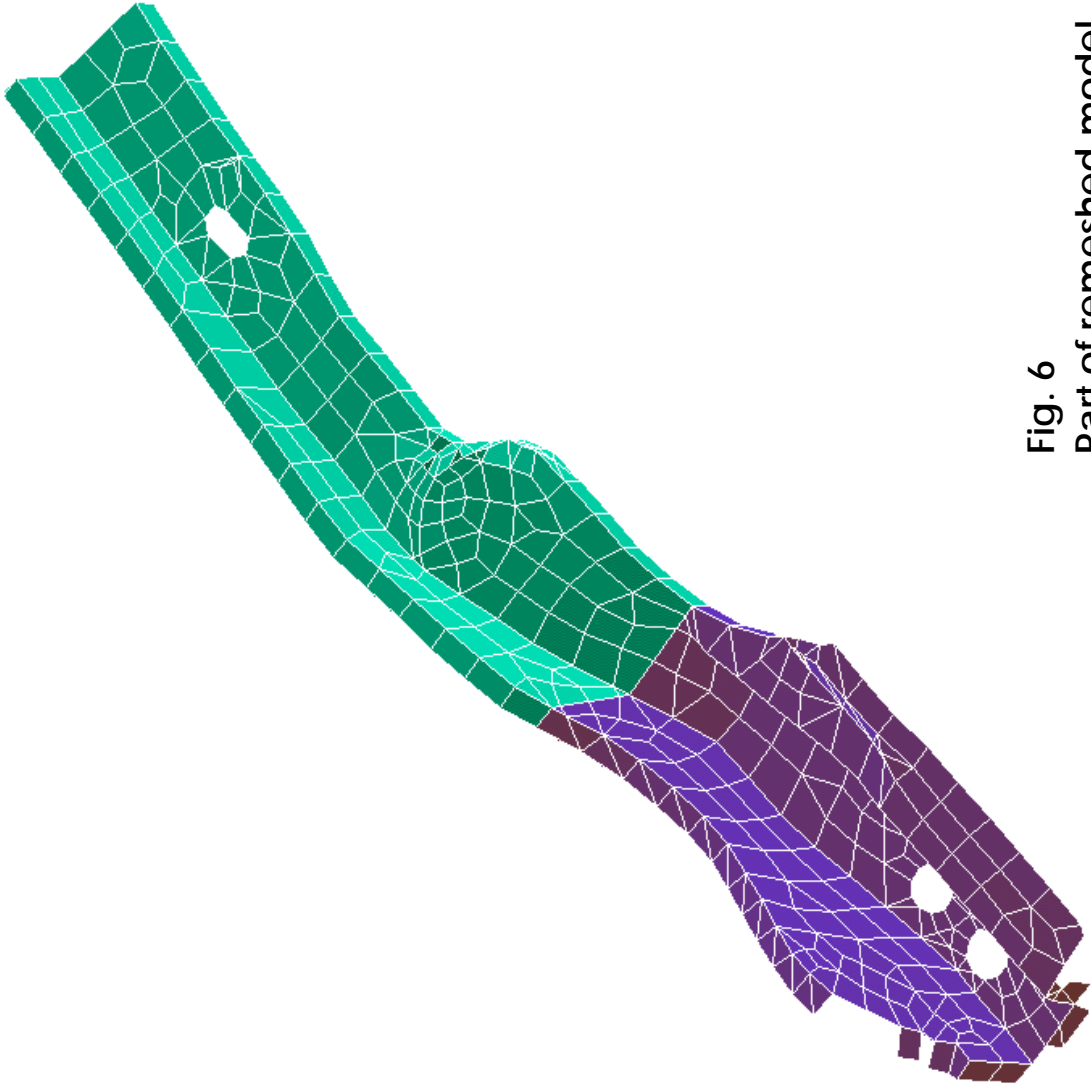


Fig. 6  
Part of remeshed model

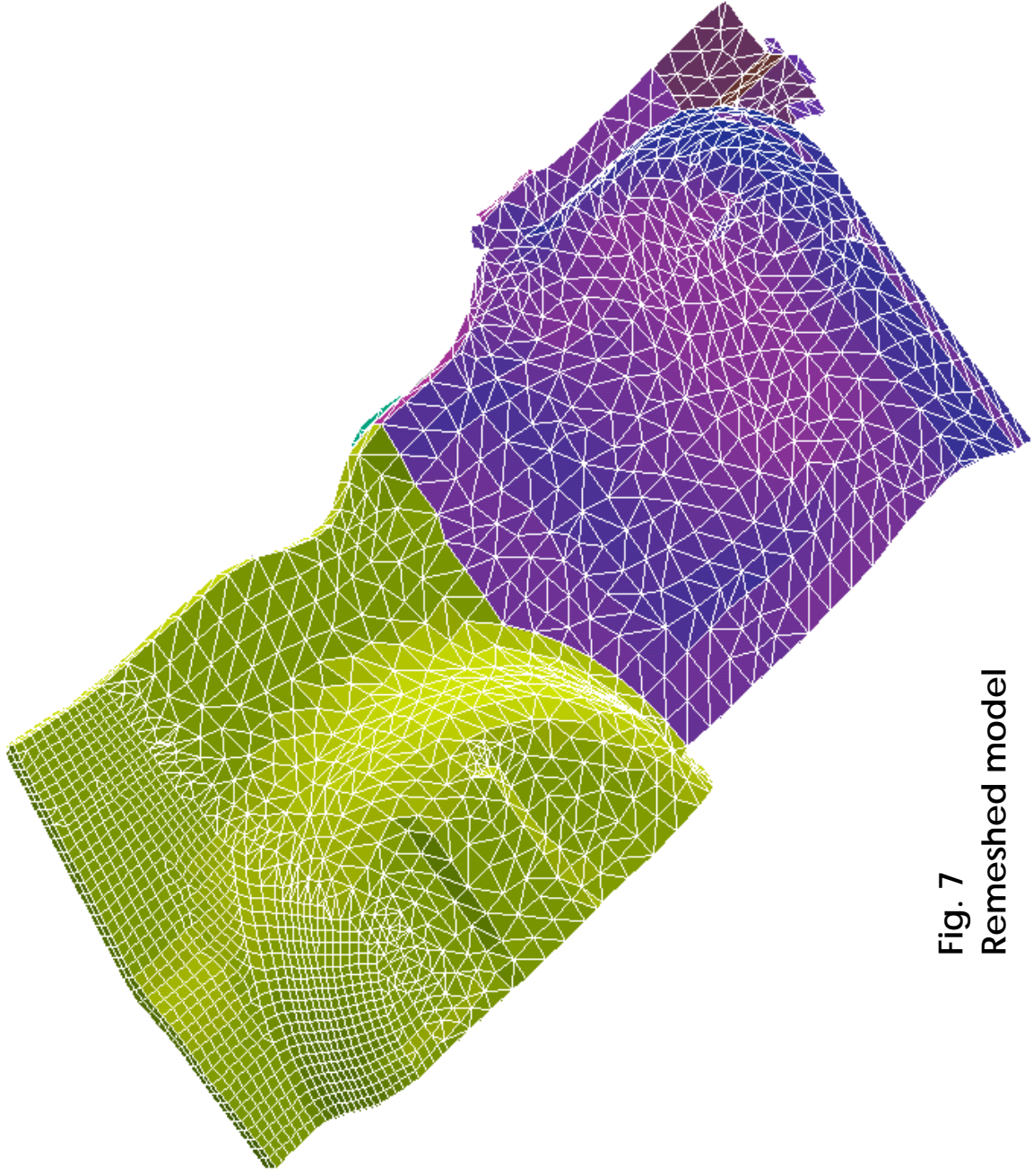


Fig. 7  
Remeshed model



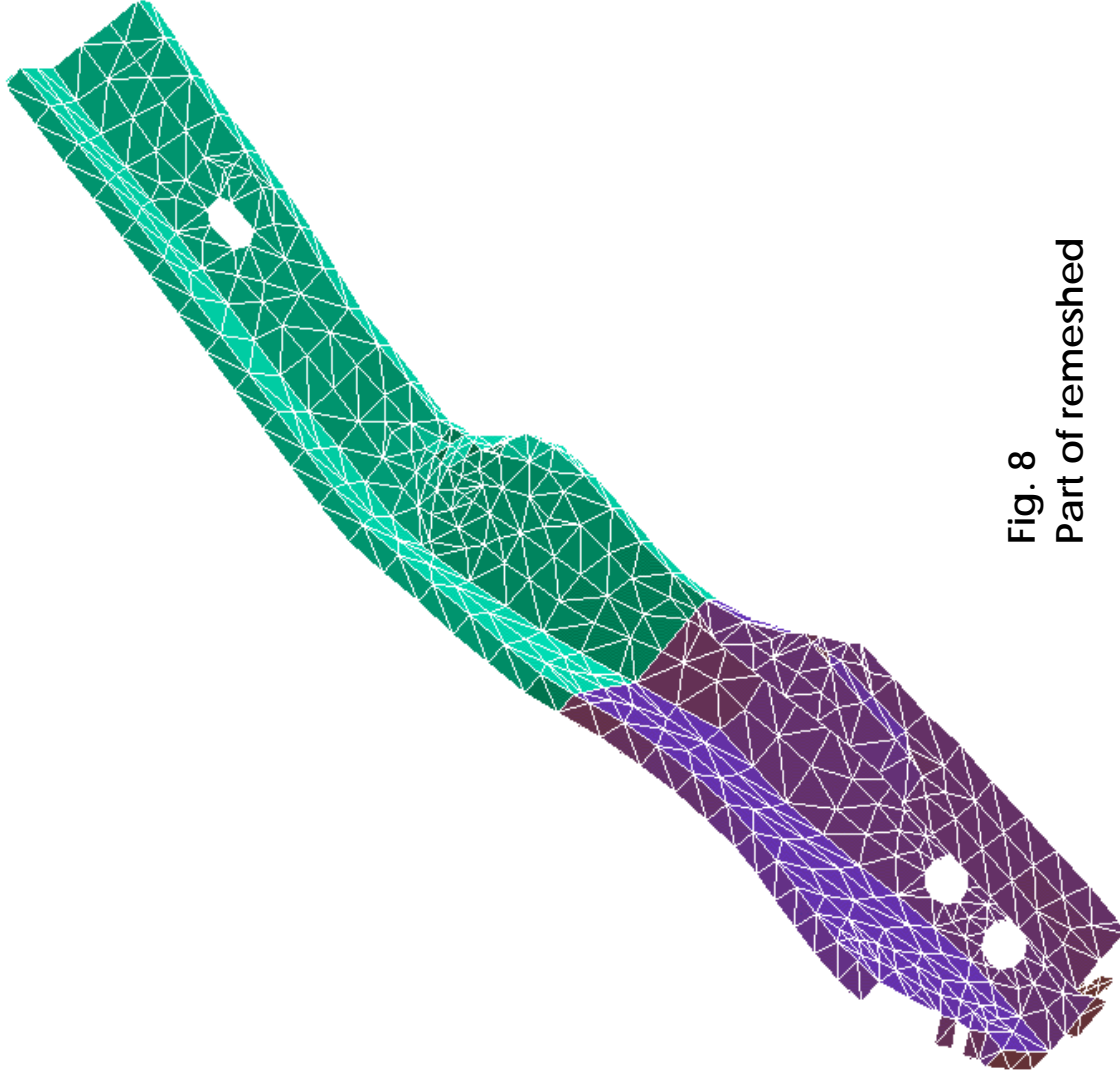


Fig. 8  
Part of remeshed