Interesting Things I've Been Working On.

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Developers Forum
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LSTC
Livermore Software Technology Corp.

Outline

- DYNAIN file in LSDA format
- LSDA based input
- New decomposition options
- DEFINE_CONTACT_EXCLUSION
- LOAD_SEGMENT_CONTACT_MASK

What is LSDA?

- LSTC Data Archival format
- Designed for robustness, flexibility, single write
- NOT a “database” format
- Mimics a UNIX file system
- Data records have type, name, length
- Automatic type conversions within reason (no integer<->real)
- Source code available without restriction on LSTC ftp site

LSDA based DYNAIN

- More efficient than ASCII format
- Allows mixing of single and double precision
- Flexible and extensible for the future
- Not all DYNAIN keywords are supported
- Set FTYPE = 3 on *INTERFACE_SPRINGBACK card
- Available in Dev r90390

LSDA based DYNAIN

Keywords supported so far

BOUNDARY_SLIDING_PLANE
BOUNDARY_SPC_NODE
CONSTRAINED_ADAPTIVITY
DEFINE_COORDINATE_NODES
DEFINE_COORDINATE_VECTOR
ELEMENT_BEAM
ELEMENT_SHELL
ELEMENT_SOLID
INITIAL_STRAIN_SHELL
INITIAL_STRAIN_SOLID
INITIAL_STRESS_SHELL
INITIAL-STRESS_SOLID
INITIAL_VELOCITY_NODE
NODE
REFERENCE_GEOMETRY

LSDA based input

- Each keyword is a top level directory
- Each top level directory can have any number of subdirectories (corresponding to multiple instances of the keyword)
- More efficient than ASCII format
- Flexible and extensible for the future
- Available via a standard *INCLUDE statement
- All DYNAIN keywords plus:
  - *DEFINE_COORDINATE_SYSTEM
  - *STRESS_INITIALIZATION

LSDA example: *ELEMENT_SHELL

/ELEMENT_SHELL/0/ might contain N elements:

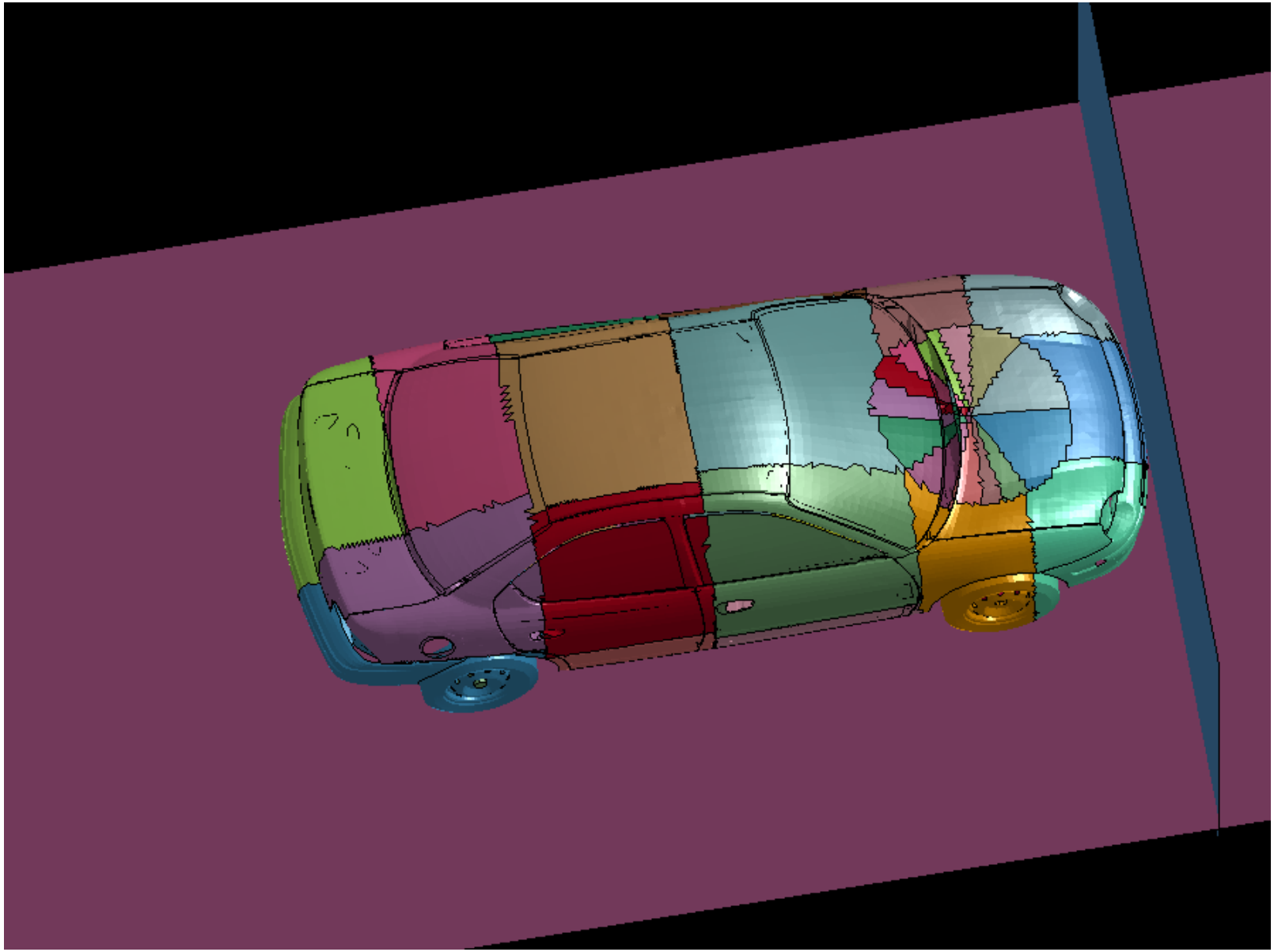
I8*N	id
I8*N	mat
I8*N*K	connectivity (K=3,4,or 8)
R*K*N	thickness (optional)
R*N	offset (optional)
I8*N	mcid (optional)
R*N	beta (optional)
I8*N*K	scalar_node_ids (optional)

New Decomposition Options

Example: Neon model
Added these input lines:

```
*CONTROL_MPP_PFILE
decomp { numproc 20 show
region { cylinder 3700 0 0 0 0 1 500 0
         c2r 3700 0 0 0 0 1 1 0 0 sy 1000 distribute }
}
```

“distribute” results

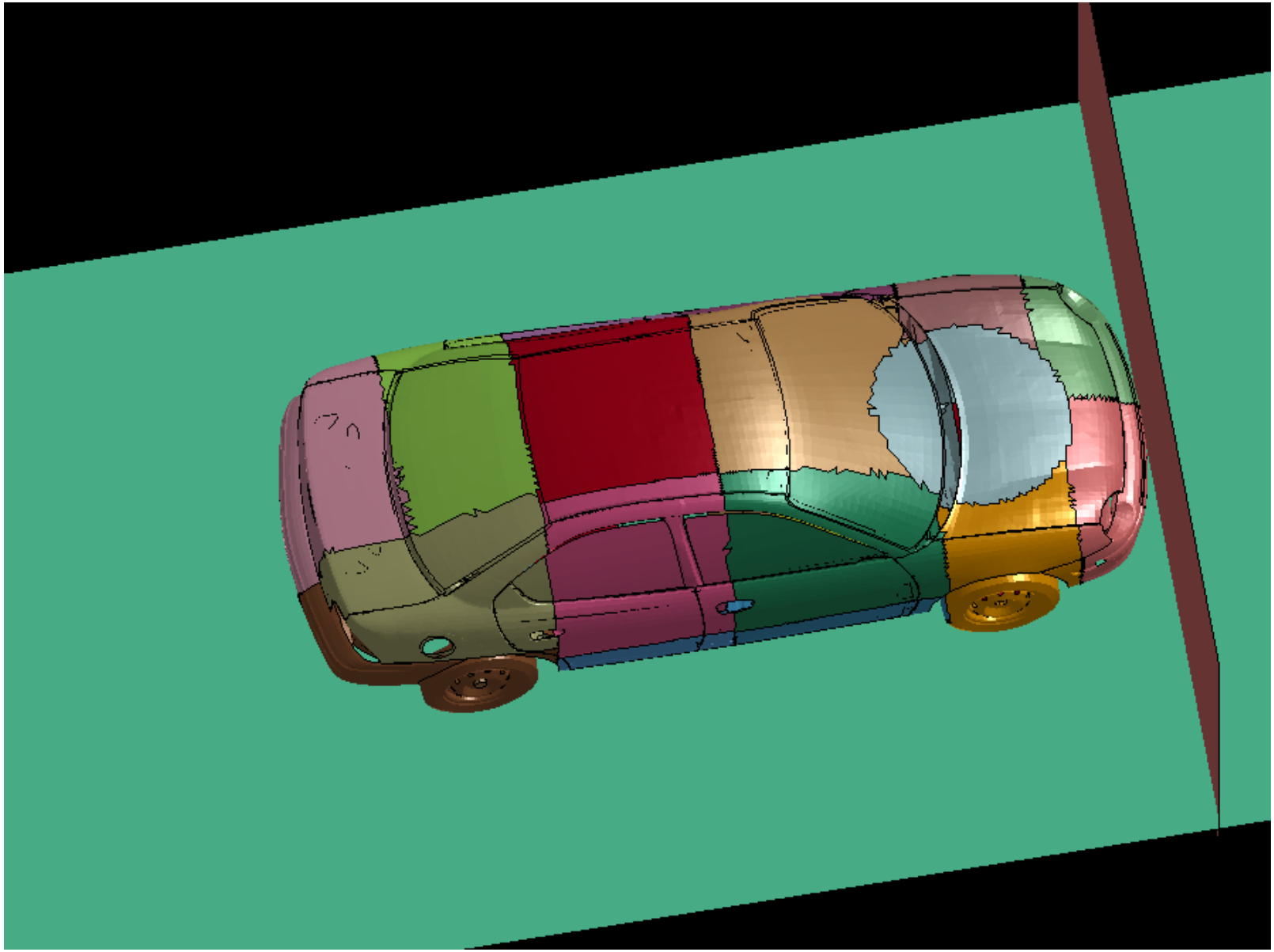


New Decomposition Options

If you substitute “lump” for “distribute” you have:

```
*CONTROL_MPP_PFILE
decomp { numproc 20 show
region { cylinder 3700 0 0 0 0 1 500 0
         c2r 3700 0 0 0 0 1 1 0 0 sy 1000 lump}
}
```

“lump” results



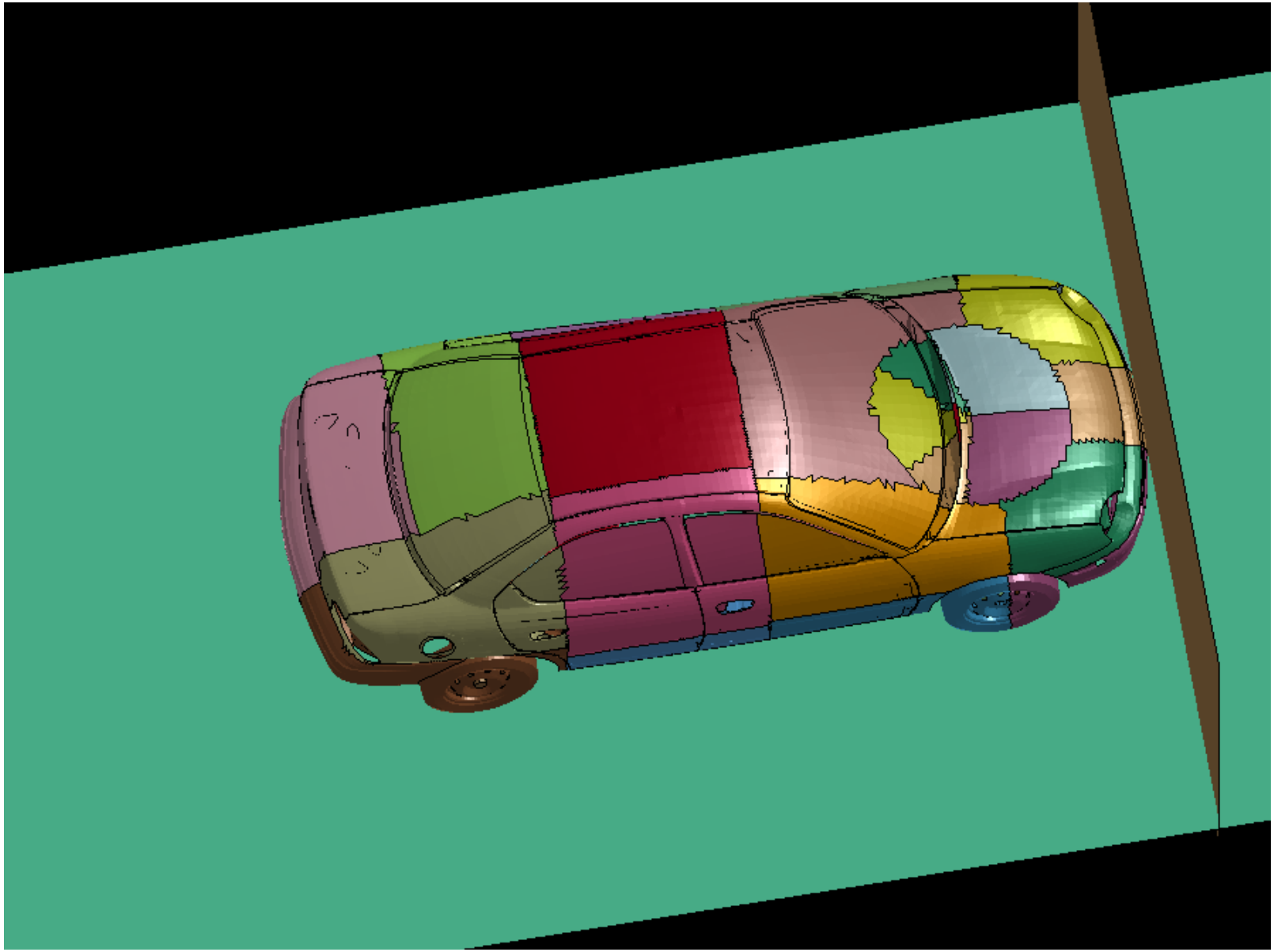
New Decomposition Options

New options: nproc and %proc

- nproc forces a specific number of processors
- %proc uses a certain percentage of the processors

```
*CONTROL_MPP_PFILE
decomp { numproc 20 show
region { cylinder 3700 0 0 0 0 1 500 0
         c2r 3700 0 0 0 0 1 1 0 0 sy 1000 %proc 25}
}
```

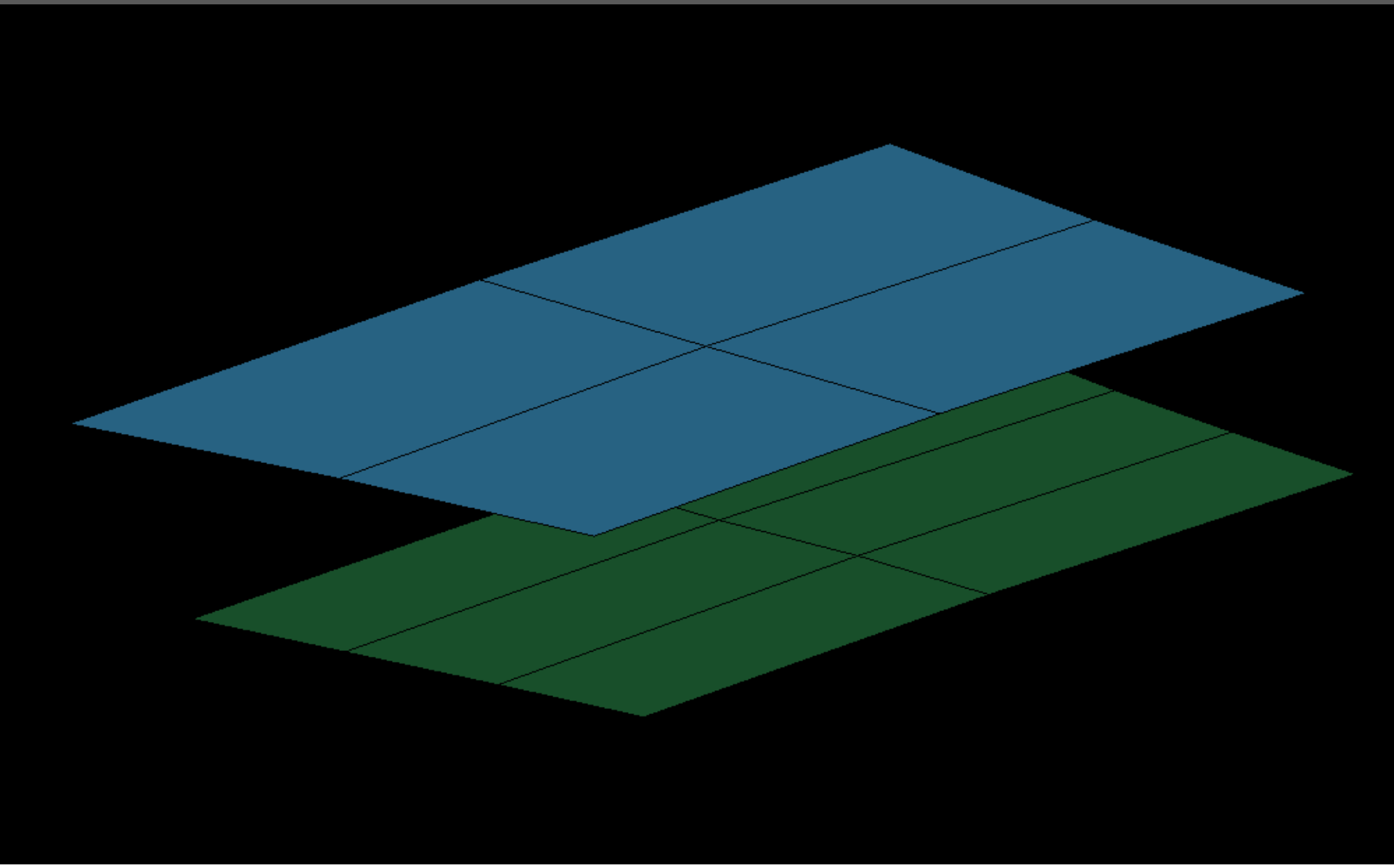
“%proc 25” results



*DEFINE_CONTACT_EXCLUSION

- Allows nodes to be excluded from a non-tied contact if they are active in a tied contact.
- Target contact must be of type SINGLE_SURFACE or *_TO_SURFACE, with SOFT != 2
- Any number of tied contacts may be in the exclusion list
- The excluded nodes may still experience contact forces
- MPP only

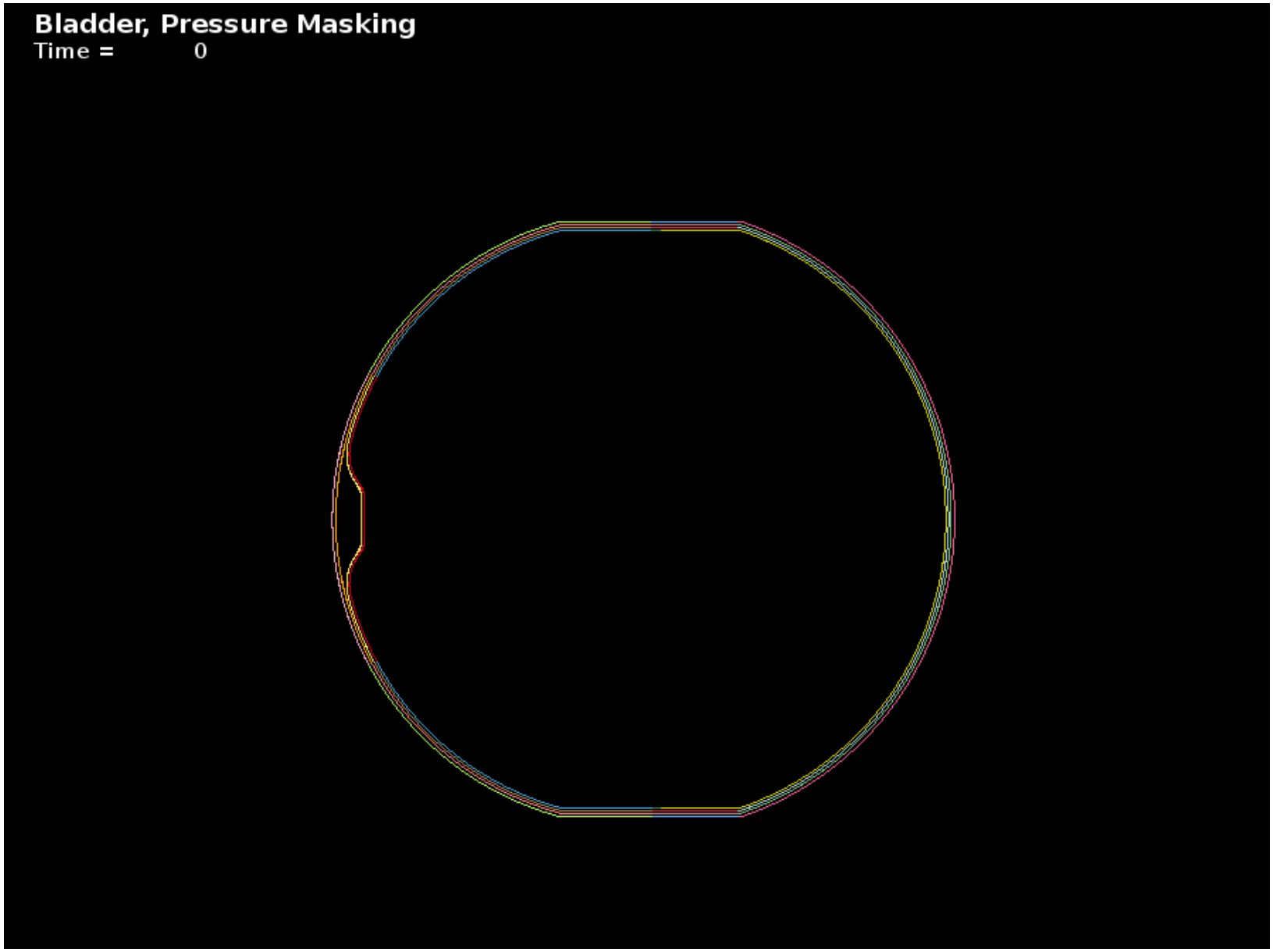
*DEFINE_CONTACT_EXCLUSION



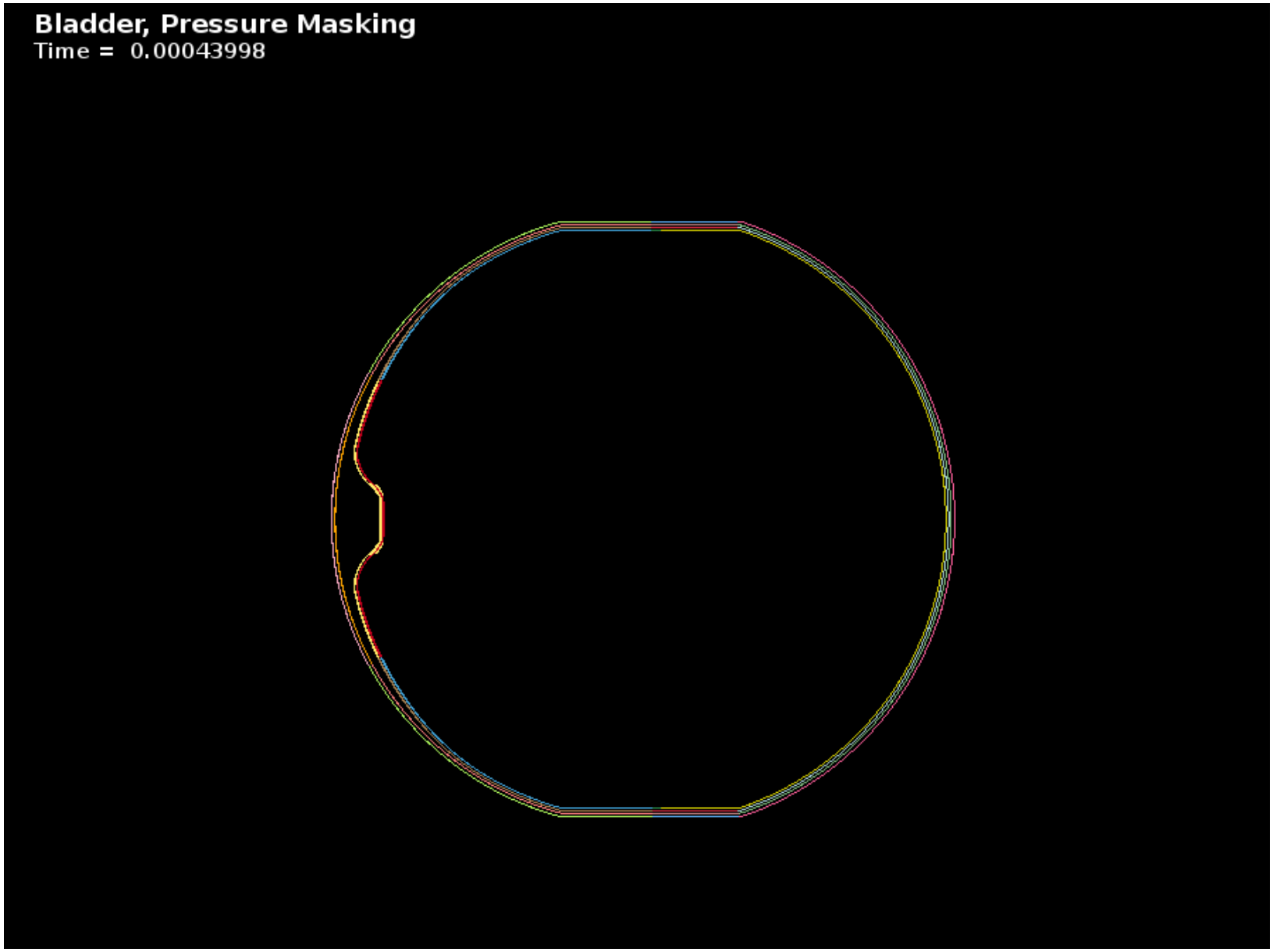
*LOAD_SEGMENT_CONTACT_MASK

Prevents the application of *LOAD_PRESSURE_SET to portions of the structure that are obscured by contact

*LOAD_SEGMENT_CONTACT_MASK



*LOAD_SEGMENT_CONTACT_MASK



*LOAD_SEGMENT_CONTACT_MASK

*LOAD_SEGMENT_CONTACT_MASK

- Lower and upper contact pressure thresholds are specified.
- Any number of contact interfaces may be given.
- AUTOMATIC_TIEBREAK contacts may be used, but if so then all must be AUTOMATIC_TIEBREAK, and the pressure thresholds are ignored. Pressure is masked only until tiebreak failure.