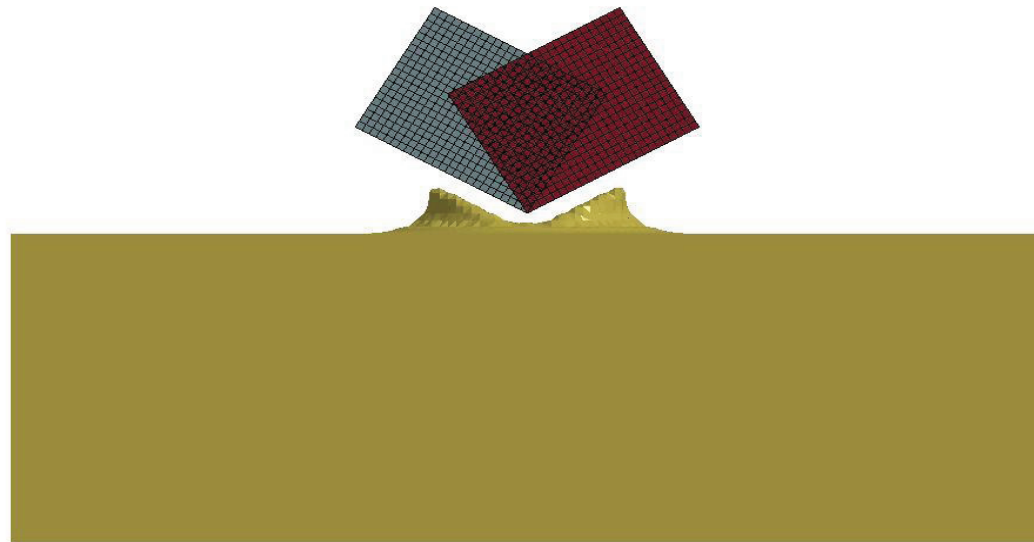


Application: Explosion II – Model Description

- Blast mine on two boxes; All box edge nodes are fixed. To study HE/Soil motion at an contact angle.
- S-ALE mesh spans from $(-65.0, -65.0, 0.0)$ to $(65.0, 65.0, 80.0)$ modeled by 1,352,000 $(130 \times 130 \times 80)$ elements; Box dimension $25 \times 20 \times 50$ placed at an angle of 30 degree to the ground.
- Unit system g-cm-mcrs



Application: Explosion II – Model Setup 1

*ALE_STRUCTURED_MESH					
MSHID	PID	NBID	EBID		
1	101	100001	100001		
CPIDX	CPIDY	CPIDZ	NID0	LCSID	
1001	1001	1003			

MSHID: Mesh ID (for future use)

PID: Part ID assigned to the mesh
NO NEED to define *PART card

NBID: Starting Node ID

EBID: Starting Element ID

NID0: Origin Node ID

LCSID: Local Coordinate System ID

*ALE_STRUCTURED_MESH_CONTROL_POINTS			
1001			
	1		-65.
	131		65.

*ALE_STRUCTURED_MESH_CONTROL_POINTS			
1003			
	1		0.
	81		80.

Application: Explosion II – Model Setup 1

*SET_SEGMENT_GENERAL							
SID							
1							
OPTION	MSHID	XMIN	XMAX	YMIN	YMAX	ZMIN	ZMAX
SALEFAC	1	1	1				


*SET_SEGMENT_GENERAL							
SID							
2							
OPTION	MSHID	XMIN	XMAX	YMIN	YMAX	ZMIN	ZMAX
SALEFAC	1			1	1		

SALEFAC option in *SET_SEGMENT/NODE/SOLID_GENERAL will include all segments/nodes/solids at S-ALE mesh face.

XMIN/XMAX, YMIN/YMAX, ZMIN/ZMAX: 6 faces at LOCAL coordinate system.

Application: Explosion II – Model Setup 2

*ALE_MULTI-MATERIAL_GROUP	
PID	PTYPE
2	1
3	1
4	1

1 to 1


*PART				
PID	SECID	MID	EOSID	HGID
2	2	2	2	2
3	3	3	3	2
4	4	4	4	2

PID	MATERIAL	AMMG
2	HE	1
3	Soil	2
4	Air	3

- *SECTION should always be 11. Same SECID OK.
- *HOURGLASS form and coefficient should always be 1 and 1.0e-6. Same HGID OK.
- PIDs not used elsewhere. Only to be put into *ALE_MULTI-MATERIAL_GROUP card.

Application: Explosion II – Model Setup 3

*INITIAL_VOLUME_FRACTION_GEOMETRY							
SID	IDTYP	BAMMG					
101	1	2					
TYPE	FILLOPT	FAMMG				"4 = Cone"	
4	0	1					
X0	Y0	Z0	X1	Y1	Z1	R1	R2
0.0	0.0	36.0	0.0	0.0	40.0	5.5	5.5
TYPE	FILLOPT	FAMMG				"1 = PART/PSET"	
3	0	3					
X0	Y0	Z0	XCOS	YCOS	ZCOS		
-3.5	-3.5	45.0	0	0	1		

1. All to "Soil";
2. Inside the cylinder h=4cm, r=5.5cm and buried 5cm under soil to "HE";
3. Above the plane (z=45cm) to "Air"

Application: Explosion II – Model Setup FSI & MISC

Couple boxes to HE and Soil

*CONSTRAINED_LAGRANGE_IN_SOLID							
SLAVE	MASTER	SSTYP	MSTYP	NQUAD	CTYPE	DIREC	MCOUP
12	101	0	1	2	4	2	-12
START	END	PFAC	FRIC	FRCMIN	NORM	NORMT	DAMP
		-5					
CQ	HMIN	HMAX	ILEAK	PLEAK			
			2	0.1			
IBOXID	IPENCK	INTFOR	IALESOF	LAGMUL	PFACMM	THKF	
						1.0	

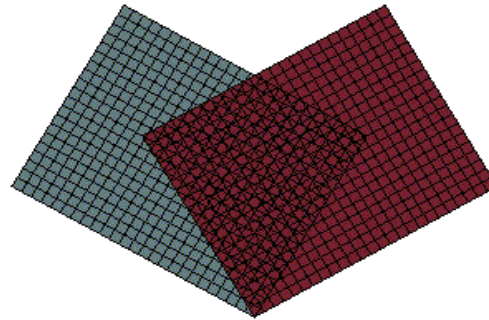
Transmitting boundary

*BOUNDARY_NON_REFLECTING		
SEGID	AD	AS
1	0.0	0.0
2	0.0	0.0
3	0.0	0.0

Explosion center

*INITIAL_DETONATION				
PID	X	Y	Z	LT
101	0.0	0.0	36.0	0.0

Application: Explosion II – Result



S-ALE :18min57s 2043 cycles; ALE: 24min47s 2382 cycles .

Per cycle time: S-ALE 384 versus ALE 428 (nano-second); 10% speedup
12 CPU MPPDYNA dev.105342 single precision