

**Computational Methods in Additive Manufacturing
MECH-6024, MECH-5124**

Group Assignment 5 (Group of 2)

**To be worked in groups of two, include both names on the final report. Do not
consult other groups.**

Due on April 9, 2020 by 3:30 pm

You are provided with the linear octrees of two objects A and B. The node numbering scheme presented in the paper by Ahuja and Nash is followed here. Please refer to Figure 1 of the paper by Ahuja and Nash for the node numbering convention. The root octree for both objects is the same and is centered at (0, 0, 0). The size of the root node of the octree is 100 cms.

Object B is required to be translated by (-5, 48, 0). The order of translation is 5 units along the negative x-axis followed by 48 units on the positive y-axis. It is required to check whether Object B collides with Object A by performing an intersection operation. Use binary notation for translation by 48 units and 2's complement notation for translation by -5 units. (Refer to paper by Ahuja and Nash posted) You are required to provide the following:

1. The translated octrees of Object B after the x-axis translation and after the final y-axis translation respectively in linear form.
2. The results of the intersection of object B in the translated position with object A. If there is an intersection, you are required to provide the intersection octree between the two objects and the total volume of intersection.

You can complete the entire assignment manually or use Matlab, Python or any other software program. In either case, your report should present details of the translation and intersection operation.

OBJECT A

r7002020, r7002021, r7002022, r7002023, r70020600, r70020601, r70020602, r70020603, r70020610, r70020611, r70020612, r70020613, r70020620, r70020621, r70020622, r70020630, r70020631, r70020632, r70020633, r70020635

OBJECT B

r5200012, r5200013, r5200016, r5200017, r52000520, r52000521, r52000522, r52000523, r52000530, r52000531, r52000532, r52000533, r5202230, r5202231, r5202234, r5202235, r52022700, r52022701, r52022702, r52022703, r5202710, r5202711, r5202712, r5202713