The strain energy release rate increases with the size of the beam. The strain energy release rate becomes equal when the size of the beam increases. So it shows the size effect of strain energy release rate decreases when the size of the beam increases.

The strain energy release rate increase with the length of the beam. the strain energy release rate varies lightly but constantly with the length of the beam. So it shows that that the size effect of strain energy release rate in length is less but constantly moving with the length of the beam.

The strain energy release rate increases with the depth of the beam of constant length having different notch depths. the variation of strain energy release rate is less when the depth increases of having higher lengths compared to lower lengths. So the size effect behavior of strain energy release rate is less when the depth increases for the higher lengths of the beam compared o the lower lengths of the beam.

The strain energy release rate increases with the notch depth also. It shows the lines are very flatter. It means there is very small variation in the strain energy release rate with notch depth ratio of the beam. So size effect of strain energy release rate is less when the notch depth of the beam increases.

4. Conclusions

In the present study the size-effect analysis of various fracture parameters obtained from different sizes of the beam were calculated. The fracture parameters were determined from three-dimensional finite element analysis using ABAQUS 6.10 in discrete crack modeling of size-ranging from 100-400 mm for which the input data were obtained from cohesive crack model. A comparative size-effect study was carried out using the possible fracture parameters from DCM, TPFM, SEM, ECM, DKFM and DGFM. In general, it was observed that all the fracture parameters were dependent on geometrical factor and specimen size. From present numerical study the following remarks can be highlighted.

i. All fracture parameters obtained from numerical analysis of different sizes of beams are exhibiting the size effect phenomenon.
ii. The critical stress intensity factor obtained from numerical analysis gave proximate results when compared to the stress intensity factor obtained from TPFM.
iii. The crack tip opening displacement obtained from numerical analysis gave proximate results when compared to the Double K model and TPFM. But when continuously increasing sizes of the beam the crack tip opening displacement values of numerical analysis equals to the crack tip opening displacement of Double K model.
iv. When the size of the beam increases, the size effect behavior of fracture parameters are increases till some point and then remains constant which shows that the size effect behavior gets disappears.
v. When the length of the beam increases, the size effect behavior of all fracture parameters is small compared to other dimensions, but varies constantly.
vi. When the depth of the beam increases, the size effect behavior of all fracture parameters is large compared to other dimensions, but this behavior disappears while continuously increasing the depth.
vii. When the notch depth increases, then the size effect behavior of fracture parameters increases.

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