the elastic modulus had increased appreciably. AC Reddy model as mentioned in Eq. (2) considers the influence of voids/porosity in the nanocomposite. The values obtained by this model are lower than those obtained from FEA because the voids are not considered in the finite element analysis of the nanocomposites. This is due to the fact that the existence of voids in the nanocomposites. The presence of voids, even at a very low volume fraction, can significantly degrade the material properties [12].

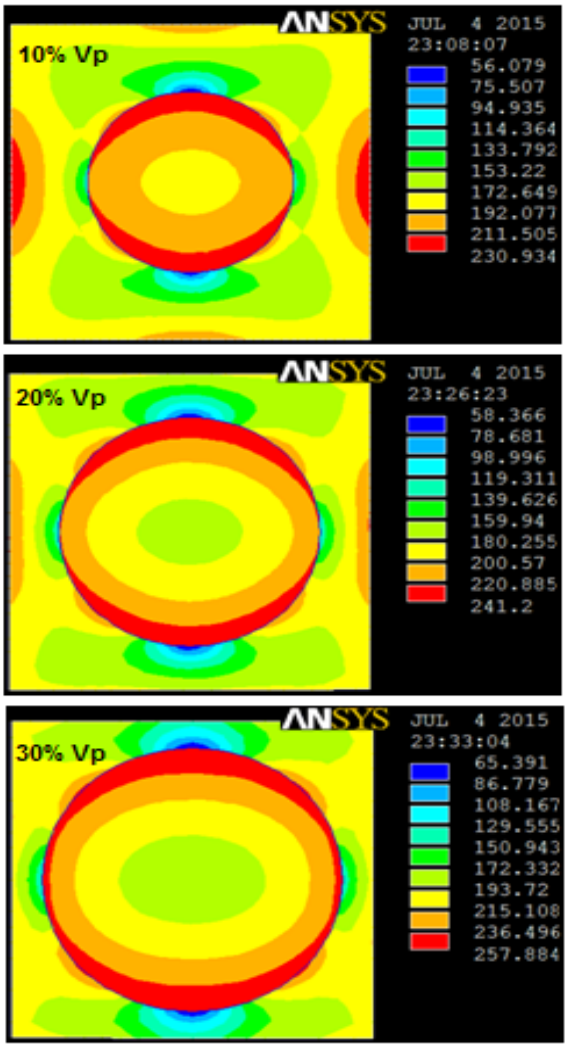

Figure 9: von Mises stress.

Table 2: Elastic modulus AA6063/carbon black nanocomposite

Model	Elastic Modulus, GPa		
	10% Vp	20% Vp	30% Vp
Rule of Mixture	88.05	93.36	98.68
AC Reddy	148.33	158.54	167.15
FEA	165.21	174.87	177.18

4. Conclusion

The tensile strength is increased with an increase of carbon black content in the nanocomposites. The adhesive bond is broken between the carbon black nanoparticle and AA6063 alloy matrix in the nanocomposite when the stress is exceeded the tensile strength (241 MPa) of the matrix. The RVE has expanded elastically away from the nanoparticle in the direction of the tensile loading. By increasing the nanoparticles the elastic modulus has increased appreciably. The presence voids can reduce the strength and stiffness of the nanocomposite.

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