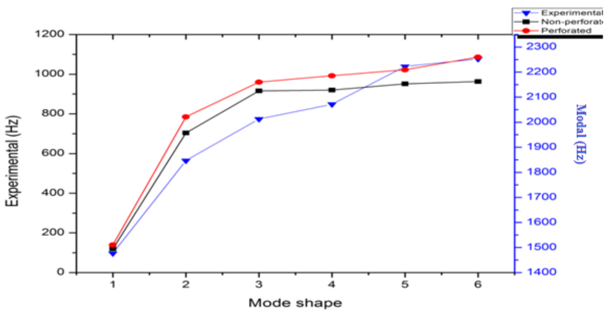

Figure 14. Mode shape versus frequency graph for modal and experimental results

6. CONCLUSIONS

Comparison of results of structural analysis renders a decreased equivalent elastic strain and equivalent von-Mises stress for the proposed design and increased total deformation. Deformation has been found to increase by 8.8 % whereas strain and stress values decreased by 9.5% and 12.9 % in the modified design. This implies that under static loading condition, the proposed perforated muffler model has more strength than the non-perforated design from equivalent von-Mises stress values. As such the perforated elliptical chamber muffler model gives efficient noise reduction without any loss of structural strength.

Modal analysis results for both the muffler models follow nearly the same pattern of vibration at their respective natural frequencies. These natural frequencies must be kept in mind while designing the muffler so as to avoid resonance. It can be observed that the maximum value of total deformation under dynamic loading condition occurs at the sixth mode shape. Thus at an increased natural frequency the deformation in the muffler is seen to increase non-linearly as observed from the study of the six mode shapes. The maximum total deformation is comparatively higher for the non-perforated muffler model at a frequency of 2162.2 Hz.

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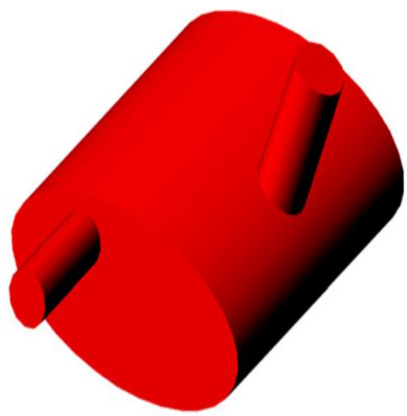
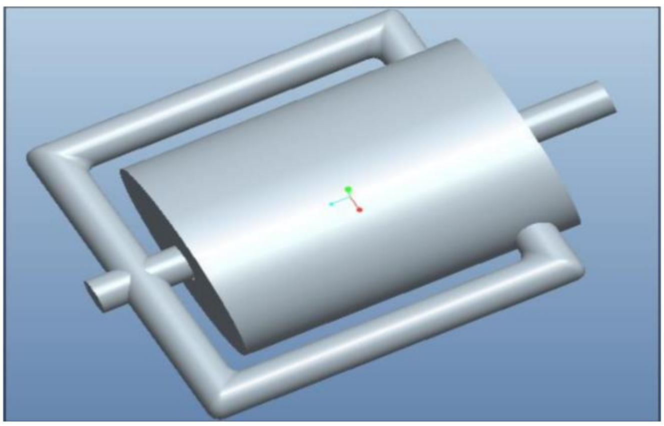
APPENDIX



Ref. Fig. A: CAD model of elliptical chamber muffler having an end inlet and side outlet port



Ref. Fig. B: CAD model of extra divided inlet tube along with extended inlet and outlet