Aero-Acoustic Modelling of Radiator Fan

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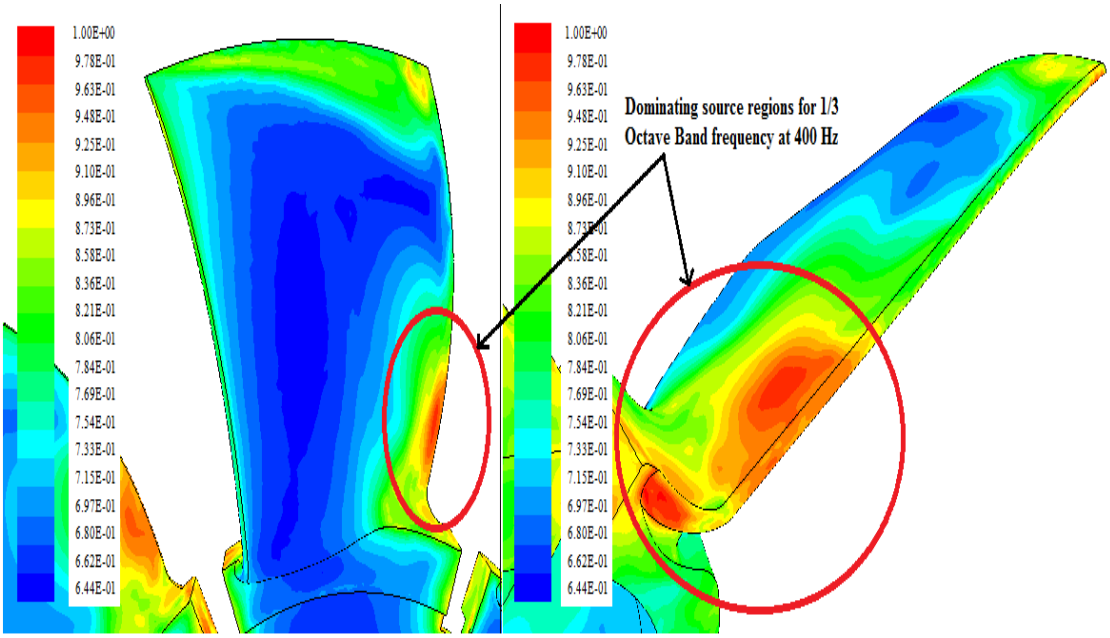

Fig: Normalized Contours of Surface Pressure Level for 1/3 rd Octave Band at 400Hz

Axial fan is used inside radiator for heat dissipation of coolant which in turns cools engine and also provide air circulation through generator. This axial fan is a major source of noise generation inside the generator. Now a days Generator sets (Gensets) have to meet noise limits in different parts of the world, such as Central Pollution Control Board of India's (CPCB-II) norms in India or European Commissions (CE) Regulation (2000/14/EC). For developing genset's to meet such noise limits, it is important to predict more accurate noise levels using existing noise prediction tools before manufacturing genets. In current project work, to address the experimental challenges, a numerical analysis of noise prediction by using Ffowcs Williams and Hawking's method was used. In this study, aero-acoustic analysis for noise prediction in radiator fan is done by using suitable computational fluid dynamics tool like ANSYS. Steady state simulation shows acceptable results of tonal noise at blade pass frequency and its harmonics at radial receiver location. This shows that current methodology is suitable for given problem and results are acceptable to initialize transient state. Numerical simulation results of Sound Pressure Level (dBA) value at 1/3 rd Octave Band frequency shows good correlation with experimental testing results at certain distance from fan. From numerical analysis carried out in present work, it is seen that the predicted noise levels are in good agreement with experimental results for frequency range of 20 - 2000 Hz.