

Acoustically Enhanced Heat Transfer

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OBJECTIVE

- Gain a better understanding of the interactions of a mean fluid flow and an acoustic field
- Measure the heat flux for a base case flow and a flow with acoustic enhancement
- Evaluate the performance of actively enhancing heat transfer via an acoustic field
- Examine the enhancement effect for both gas and liquid phase

OUTLOOK

- Carry out further investigations at additional parameters
- Proceed to testing of liquid flow on a smaller scale
- Develop correlations for acoustically enhanced heat transfer of fluid flows
- Investigate influence of acoustical fields on heat transfer in two-phase flow regime

EXPERIMENTAL SETUP - AIR

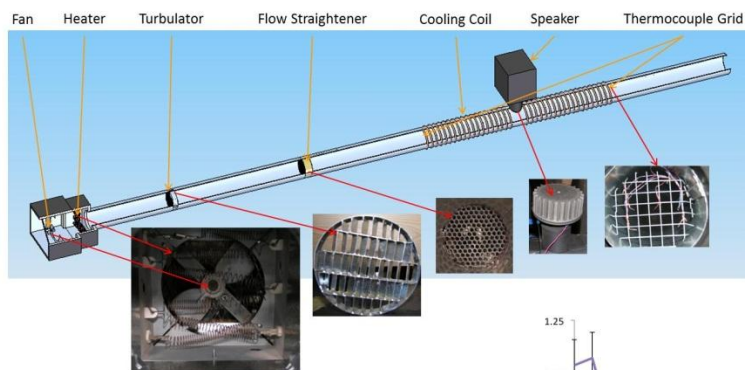


FIGURE 1: CAD-model of prototype test setup

EXPERIMENTAL RESULTS - AIR

CONCLUSIONS

- The experiments have shown that the heat transfer can be enhanced significantly with an acoustic field
- The effect of the sound field depends on frequency and sound level, whereas further parameters cannot be excluded
- To examine in further experiments:
- Overall system performance gain or loss through energy balance
- Influence of acoustical fields on heat transfer in two- phase flows

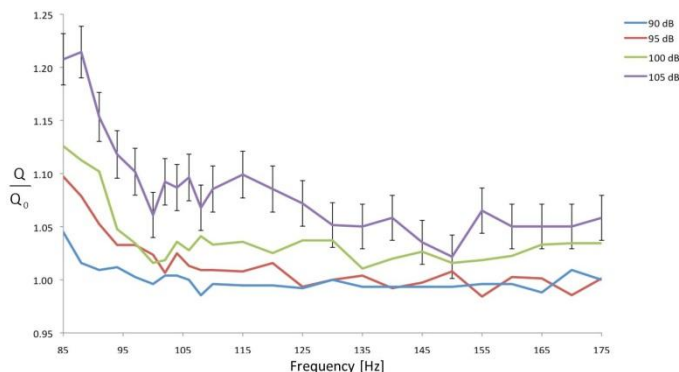


FIGURE 2: Dimensionless heat transfer enhancement plotted against the frequency at various sound levels

SELECTED PUBLICATIONS

- Vainshtein, P., et al., *Int. J. Heat Mass Transfer*. 38, 1995
- Wan, Q. and Kuznetsov, A.V., *Flow, Turbulence and Combustion*. 70, 2003
- Loh, B.-G., et al., *J. Acoustical Soc. Of America*. 111, 2002