

**Two STW-PhD grants at TU/e for research on:
Aeroacoustics of Corrugated Pipes**

Corrugated pipes are used because of their flexibility in many technological applications such as domestic appliances, LNG storage systems, risers for offshore natural gas production and cooling systems. In heat exchangers corrugated pipes are furthermore often used to enhance heat transfer.

Coupling of acoustic waves with flow instability can result into severe noise and vibration problems. Typically velocity fluctuations of 6% of the main flow velocity are observed, which correspond at atmospheric pressure with acoustical levels in the pipe of 150 dB. The aim of the present project is to investigate the fluid dynamical aspects of this problem in the case of gas transport when wall vibration is negligible.

Experiments:

Acoustical measurements on corrugated pipes with different geometries under various flow conditions will be carried out in order to localize and characterize the sources of sound. Detailed flow measurements will be carried out on up-scaled models of corrugations in a water channel flow with corrugated sidewalls.

Modeling and utilization:

Our project will provide users with design tools such as:

- Rules of thumb based on scaling laws;
- Linear prediction of onset of flow instability (Linearized Euler Equations);
- Non-linear models for prediction of pulsation amplitude (Direct Numerical Simulation).

On the short term this will lead to design rules to avoid major aero-acoustic oscillations or to find remedial control strategies.

PhD positions:

Two PhD positions are available within the framework of this project (at the Fluid Dynamics Laboratory of the Department of Applied Physics of the Technische Universiteit Eindhoven: <http://www.fluid.tue.nl/>). The project is financed by the Dutch Technology Foundation STW (www.stw.nl) and will be carried out in close collaboration with industrial partners. Detailed information can be obtained from prof. A.Hirschberg (A.Hirschberg@tue.nl)

