**READ ME**

An overview of the data and the processing steps it went through are given first to help the reader through the data. This data set contains both fluid flow simulation results from COMSOL and experimental measurements. It is arranged in the order it appears in the paper.

Simulations

Comsol models used to compare the experimental data for each frequency can be found in the folder ‘Figure 3 and ESI figure 3, 4 and 5’. For example ‘streaming\_87mhz.mph’ is a simulation at 87 MHz.

An example COMOSL model used to make predictions about fluid flow in chambers of different sizes is given in the folder ‘figure 5’. (height\_300\_width\_300.mph)

Detailed explanation of contents of folders:

Figure 1 and ESI figure 2

This folder contains all the information required to calculate the sound field generated by a SAW as it appears in the paper. There is an FEM model written in COMSOL used to generated the most accurate solution for the sound field due to a SAW, and also a Matlab code with generates the analytical expression for the sound field as described in equation 2. The inkscape files used to make the figures have also been included.

‘342 MHz p field comsol simulation.mat’ stores the pressure field for a 342 MHz SAW beam as calculated by the FEM simulation

‘y coord 342 MHz p field comsol simulation.mat’ stores the y coordinates that go with the pressure values in the file ‘342 MHz p field comsol simulation.mat’.

‘z coord 342 MHz p field comsol simulation.mat’, stores the z coordinates that go with the pressure values in the file ‘342 MHz p field comsol simulation.mat’.

‘soundfield\_in\_fluid.m’ is a matlab code that will calculate the sound field according the equation 2 in the paper and compare it with the output from the FEM simulation ‘SAW beam model.mph.’.

Figure 2

This folder contains all the vibrometer data for the 3 different PIV data sets, 43 MHz, 87 MHZ and 342 MHz and the matlab program that was used to get averaged data and Gaussian fit parameters. The Gausissan fit parameters (peak height, width, and position etc) were used as inputs to the simulation to test it against the experiment.

For each frequency the data is stored in .mat files called things like ‘minus 15’ or minus 20’ etc. The title refers to the electrical input power (before amplification), this was then put through an amplifier that boosted the electric signal input by 40 db. (so for example minus 10 dbm is the vibrometer measurements when the electric signal to the IDTs was 30 dbm, or 1 Watt).

Figure 3 and ESI figure 3, 4 and 5

PIV measurements were taken for 43 MHz, 87 MHz and 342 MHz SAW input at different heights above the chamber floor and electrical input power (dB). Immediately after the PIV measurements, vibrometer scans of the SAW wave amplitude along the chamber floor were taken, therefore electrical input power used in the PIV experiment could be linked to the SAW velocity amplitude and the PIV measurements.

The folder ‘FEM simulations’ stores the COMSOL simulations that were used to make predictions on the fluid streaming observed in the experiments.

The folder ‘quiver plots and data’ gives the quiver plot flow data for each quiver plot that appears in the paper and ESI.

For example, ‘final averaged quiver plot for h=25 87 MHz’ is the quiver plot data for 87 MHz at h=25 micrometers.

Figure 4

This folder contains data on the averaged fluid flow over the whole chamber at different heights and input powers and plots them against the simulation predictions.

Contents

xyerrorbar.m

is a matlab function that lets one plot data with both an x and a y errorbar.

Average\_data\_set\_and\_compare.m

Is the program used to gather all the data and plot it in xy errorbar format. This can be used to

Quickly play with the data and plot it in different graph/scales ect.

ldv\_vel\_amp\_’x’.mat

matrix storing the averaged ldv velocity amplitudes for each frequency ‘x’, with increasing electrical input power.

ldv\_errors\_’x’.mat

the std for each measurement stored in ldv\_errors\_’x’.mat

mean\_’x’\_piv.mat

averaged flow velocity magnitude over whole chamber. (Each column is for a different chamber height) The rows go in ascending order of electrical input power.

std\_’x’\_piv.mat

 standard deviation of the average flow.

x\_’x’.mat

 matrix storing velocity magnitude in x direction from simulation results for frequency ‘x’.

y\_’x’.mat

 matrix storing velocity magnitude in Y direction from simulation results for frequency ‘x’.

figure4.opj

 this is an origin file that contains all the data and plots that were used in the paper

Figure 5

‘figure 5.obj’ contains the origin project file with all the data

‘height\_300\_width\_300.mph’ is an example of the fem simulation used to prediction flow in different chamber sizes. Other FEM simulations were modified by changing the height/width of the chamber.

Figure 6

 ‘Figure 6.m’ is a matlab code that creates the surface plots used in the paper.

Origin files can be provided as .csv upon reasonable request.