

## Matlab code, figure and data files for Solar Energy paper “Optimal passage size for solar collector microchannel and tube-on-plate absorbers”.

This code runs in Matlab r2017a. Typically a script file will either produce a single figure or is designed to be run in sections, producing one graph after another. The function files are almost always called by script files.

### Figure 1.

- figure\_1.fig
- system\_optim4b.m (n.b. values can be altered in this file to give values used in discussion later: see code comments).

### Figure 4.

- figure\_4.fig
- plot\_deltat\_e14.m

### Figure 5.

- figure\_5.fig
- plot\_deltat\_parallel\_2.m

### Figure 6.

- figure\_6.fig
- plot\_variousfluids.m

### Figure 8

- figure\_8a.fig
- figure\_8b.fig
- plot\_double\_pass.m (edit  $W_p = 10$  or  $0.1$  for 8a, 8b).

### Table 5.

- table\_5\_image.fig
- section\_figs.m

### Figure 9.

- figure\_9.fig
- plot\_a\_pde.m, called as `>> plot_a_pde(0.005, [870 3.8], 15, 320, 0.2, 1)`

### Figure 10.

- figure\_10.fig
- plot\_db\_analysis3.m

### Figure 11.

- `figure_11a.fig, plot_db_analysis3a.m`
- `figure_11b.fig, plot_db_analysis3b.m`

### Figure 12.

- `figure_12.fig`
- `plot_db_analysis4.m`
- `plot_db_analysis_4b.m` (lists optimum  $D_h$  for discussion).

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### Data used for the microchannel $F'$ correlation.

- `S234_fdash_new.mat`, created by running `generate_mcfdash4.m`

Loads into Matlab as a structure:

`S = 2×3×4 struct array with fields:`

- `Dh`
- `Fdash_i`
- `Fdash_o`
- `UL`
- `cond`
- `conditions`
- `hi`
- `hmult`
- `shape`
- `smul`
- `ts`
- `tt`
- `tt_ts`

Variables `Fdash_i`, `Fdash_o` are apparent  $F'$  values inferred by heat transfer to the inner and outer (top) surface. Identical apart from small discrepancies due to interpolation and Simpson's rule summation over grid elements. Fields `UL`, `cond`, `smul`, `ts`, `tt_ts` identify the array indexing.

- `surface_fits2.m` code snippets used in deriving the correlations.
- `predict_fdash.m` uses correlation to predict  $F'$  for the input parameters embodied in `S` so can cross-plot  $F'$  (from the PDE solution) against  $F'$  (from the correlation).

All other files are functions called by the above.

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