Instruction to run the Mathematica codes for shape analysis

1. Files in the folder “/Col\_new” and “/ftsh4\_new” contain contour data files for the WT and ftsh4 sepals, respectively.
2. ContourAnalysis\_Data\_Cornell\_201505.nb is the Mathematica notebook file to read in and plot the contours
3. PolarFourierAnalysis\_Cornell201505.nb is the Mathematica notebook file to perform polar Fourier transformation for the contour in order to remove the translational and rotational degrees of freedom for shape comparison. The code then plots both the non-normalized and the normalized contours as discussed in the main text of the manuscript. Finally, the code calculates the Shape variability (S\_2) for the normalized contours.
4. To run the codes, first open ContourAnalysis\_Data\_Cornell\_201505.nb using Mathematica version 9 or later. In the file, under the line

(\*\*\*\*\*\* Input parameters \*\*\*\*\*\*\*)

the statement

FilePath="/Users/dilaton/Desktop/Shape\_Analysis\_Mathematica\_Code/";

should be modified such that the file path contains the folder “/Col\_new” or “/ftsh4\_new”.

1. To read in and analyze the WT sepals, use

MutantName[1] = "/Col\_new";

for the next statement, or for ftsh4 sepals, use

MutantName[1] = "/ftsh4\_new";

for the next statement.

1. To run the code, simply press “shift+enter”. Note that the code can be divided into several segments; press “shift+enter” to execute each segment one by one.
2. After reading and plotting the contours, open PolarFourierAnalysis\_Cornell201505.nb and simply press “shift+return” to execute.

Instruction to run the permutation test to check if the medians of the S\_2 values from two mutants are the same, i.e., evaluation of the p-value

1. PermutationTestS2.nb is Mathematica notebook file to compare using permutation test if the medians of two lists (from two mutants) of S\_2 values are statistically different by evaluating the p-value.
2. To run the permutation test: After running PolarFourierAnalysis\_Cornell201505.nb for each mutant, the list of S2 values is printed at the end of the file.
3. Simply copy these two lists and paste them to list1 and list2, respectively in the file PermutationTestS2.nb. After pressing “shift+enter” to execute, the p-value is returned at the end of the file.