# S2 Text. Parameterization of the 2-D computational domain

Several studies use measurements of and to quantify the resistance of the cytosol and stroma, respectively. Some studies also describe the measurements of , the ratio of the chloroplast surface area facing the intercellular air space to the mesophyll surface area facing the intercellular air space. This ratio is a measure to what extent the exposed mesophyll surface is covered with chloroplasts. The aim of this section is to design a flexible geometry that can be generated by different combinations of values for anatomical parameters , , and . For this purpose, the length of a number of boundaries (, , ) in Fig C in S1 Text has to be written as a function of these parameters.

## S2.1 Parameterization

The height of the stroma compartment can be written as a function of :

## S2.2 Parameterization

In our model, it is assumed that the 2-D computational domain is a cross section of a 3-D rectangular cuboid. Therefore, the ratio of length of the chloroplast exposed to the intercellular air space to the length of the mesophyll exposed to the intercellular air space is:

which can be rewritten as:

From equations (S2.1) and (S2.2), the height of the gaps between two chloroplasts can be expressed as:

## 2.3 Parameterization of

The distance between the cell wall and the tonoplast of the computational domain can be expressed as: