# S1 Text. Construction of the 2-D computational domain

The computational domain represents a section of a mesophyll cell that contains a single chloroplast surrounded by cytosol. It consists of an $l×h$ rectangle $Ω\_{0}$ with boundaries $Γ\_{1}$ (length $l$), $Γ\_{2}$ (length $h$), $Γ\_{3}$ (length $l$), and $Γ\_{4}$ (length $h$). Boundary $Γ\_{2}$ represents the tonoplast. Boundary $Γ\_{4}$ represents the combined cell wall and plasma membrane (Fig A).

$Ω\_{0}$ was subdivided into three rectangular subdomains $Ω\_{1}$, $Ω\_{2}$, and $Ω\_{3}$. The dimensions of $Ω\_{1}$, $Ω\_{2}$, and $Ω\_{3}$ are $t\_{cyt}×h$, $t\_{str}×h$ and $t\_{cyt}×h$ respectively, where $t\_{cyt}$ represents the thickness of the cytosol and $t\_{str}$ represents the thickness of the stroma. Subdomain $Ω\_{1}$ represents the outer cytosol. Subdomain $Ω\_{3}$ represents the inner cytosol. Subdomain $Ω\_{2}$ lies between $Ω\_{1}$ and $Ω\_{3}$ (Fig B).

$Ω\_{2}$ was further subdivided into a rectangular stroma compartment $Ω\_{4}$ and two half rectangular cytosol gaps $Ω\_{5}$ and $Ω\_{6}$. The two $t\_{str}×\frac{1}{2}h\_{gap}$ half cytosol gaps $Ω\_{5}$ and $Ω\_{6}$ are adjacent to $Γ\_{1}$ and $Γ\_{3}$, respectively. The remaining part of $Ω\_{2}$ consists of the $t\_{str}×h\_{str}$ stroma compartment $Ω\_{4}$. The boundaries of the stroma compartments form the chloroplast envelope. Fig C shows the final geometry of the computational domain.

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| **Fig A:** Schematic drawing of the $l×h$ computational domain $Ω\_{0}$ and its outer edges $Γ\_{1}$, $Γ\_{2}$, $Γ\_{3}$, and $Γ\_{4}$, before compartmentation. $Γ\_{2}$ represents the tonoplast and $Γ\_{4}$ represents the cell wall and the plasma membrane. $Γ\_{1}$ and $Γ\_{3}$ represent the upper and the lower edges of the computational domain. |

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| **Fig B:** Schematic drawing of the computational domain, after compartmentation of $Ω\_{0}$ into inner cytosol compartment $Ω\_{1}$ and outer cytosol compartment$ Ω\_{3}$ , and a subdomain $Ω\_{2}$ between $Ω\_{1}$ and $Ω\_{3}$ |

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| **Fig C:** Schematic drawing of the computational domain, after compartmentation of $Ω\_{2}$ into a stromal compartment $Ω\_{4}$ and two cytosol gaps $Ω\_{5}$ and $Ω\_{6}$. |