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Simulation of Metabolic Processes in Plant Cells

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The interior of living cells can be considered as a porous medium consisting of three compartments: cytosol, chloroplasts and mitochondria. Diffusion and reactions take place inside the cytosol, inside the chloroplasts and on the surfaces of the mitochondria. Furthermore, biochemical species can be exchanged between the compartments. Consequently we need to solve a system of fully dimensional partial differential equations coupled with partial differential equations on lower dimensional manifolds. The nonlinear coupling terms result from reversible enzyme kinetics. We present an efficient algorithm for solving this system on parallel machines and investigate the role of enzyme localization on the mitochondria surfaces.

References

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