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Applying asymptotic methods to synthetic biology: modelling the reaction kinetics of the mevalonate pathway

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Highlights

- We investigate a kinetic model for the mevalonate pathway which includes inhibition effects and a sink of acetyl-CoA.
- Of the enzymes in the pathway, upregulating HMG-CoA reductase has the most significant positive effect on improving pathway efficiency.
- Upregulating pyruvate dehydrogenase complex and HMG-CoA synthase can also help, but only in conjunction with the upregulation of HMG-CoA reductase.
- We confirm our theoretical predictions by introducing the mevalonate pathway into *Cupriavidus necator*.

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