

Mathematical Modeling, Simulation and Optimization for Energy Optimal Wine Fermentation

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Abstract: We discuss model predictive control (MPC) of the cooling process during wine fermentation. Several modeling approaches based on integro-differential equations as well as on ordinary differential equations are considered. Novel models including a yeast dying phase are presented. Numerical results regarding the control inputs and the development of the substrates and the product for an industrial controller and for this MPC controller are compared. It arises that the usage of the computed MPC cooling strategy results in considerable savings for the energy consumption in the process of wine fermentation.

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