Application of Constrained Model Predictive Controller into Carbon Dioxide Tank Precooling Process

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To reduce concentration of carbon dioxide in air to prevent global warming, many ways are taken such as CCS (Carbon Capture & Storage). One of the way is to transport liquified carbon dioxide using storage ship tank from onshore and carbon dioxide is unloaded at sea floor.

When liquified carbon dioxide is directly loaded into the storage tank, sudden temperature decline will cause some problems such as mechanical instability by thermal stress and metal cracking. To control this situation, precooling process is introduced to adjust rate of temperature change.

In this work, mathematical modeling of cooling process of the carbon dioxide storage tank is established and constrained model predictive controller is adapted to control this model. Through the controller, temperature change rate is stablized.