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班級： 機械四甲 學號： 99401065 姓名：陳建璋

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Model predictive control of a solar-thermal reactor

This paper presents the application of a Model Predictive Control (MPC) system to a solar-thermal reactor for carbon-steam gasification. The controller aimed at rejecting the disturbances in solar irradiation, caused by the presence of clouds, through the manipulation of the flow rates into the reactor. Simulations of a first-principles dynamic model were used to fit a linear, time-invariant model, to be used directly in the MPC algorithm. The MPC was tuned through simulations, until robust control was achieved. The proposed control system was compared to a fine-tuned multi-loop feedback control strategy. Simulations of the controlled reactor system showed that the linear MPC was capable of minimizing the effect of the disturbances within the entire operating region, outperforming a more conventional multi-loop feedback strategy. The results obtained suggest that the proposed controller is suitable for a real-world implementation.

中文翻譯

模型預測控制太陽能熱反應器

本文介紹了一種模型預測控制（MPC）系統的應用對太陽能光熱反應器中進行的碳水蒸氣氣化反應。控制器目的是拒絕太陽輻射的干擾，在雲的存在下，通過流速操縱反應器。第一原則動態模型的模擬被用於擬合的線性時不變模型中，也可以直接在 MPC 算法中使用。MPC 通過模擬調整直到穩定控制達到。所提出的控制系統與微調多環反饋控制策略進行比較。在控制下的反應器系統的模擬顯示該線性 MPC 能夠最小化整個工作區域內的干擾的影響，表現優於更常規的多環反饋策略。得到的結果表明，所提出的控制器適於實際實現。

單字

1. Suitable

適當的；合適的；適宜的

He was just not suitable for the job. 他就是不適合幹這份工作。

2. minimizing

使減到最少，使縮到最小

We ' ve taken steps to minimize the losses . 我們已採取措施盡量減少損失。

3. suitable

適當的；合適的；適宜的

He was just not suitable for the job . 他就是不適合幹這份工作。

4. through

穿過；通過

The river runs through our village . 這條河穿過我們的村子。

5. proposed

被提議的；所推薦的

It was proposed we go to the station to meet our guests . 有人建議我們去車站接客人。

6. disturbances

擾亂；打擾

We can work here without disturbance . 我們可以在這裡不受干擾地工作。

7. directly

直接地；筆直地

She drove directly to school . 她開車直接去學校。

8. tuned

經調諧的；調好臺的

Be tuned to us for the latest sports results . 請繼續收聽我們播放的最新比賽結果。

9. manipulation

操作，運用

Some people can put back a twisted joint by carefulmanipulation . 有些人小心推拿就能把扭脫的關節矯正過來。

10. aim

把……瞄準；把……對準擲向，目標，目的

It is now our aim to set up a factory . 我們現在的目的是創辦一座工廠。

句型分析

1.

The proposed control system was compared to a fine-tuned multi-loop feedback control strategy.

所提出的控制系統與微調多環反饋控制策略進行比較。

主詞: The proposed control system

動詞: was

介詞: to

受詞: a fine-tuned multi-loop feedback control strategy

2. The results obtained suggest that the proposed controller is suitable for a real-world implementation.

得到的結果表明，所提出的控制器適於實際實現。

主詞: The results obtained suggest that the proposed controller

動詞: is suitable for a real-world implementation.

3.

The MPC was tuned through simulations, until robust control was achieved.

MPC 通過模擬調整達到強建控制的目的。

主要句主詞: The MPC

主要句動詞: was tuned through simulations

時間副詞子句: until robust control was achieved