

## SYSTEM ENGINEERING

基于混合建模技术的复合肥料养分含量MIMO软测量模型

傅永峰, 苏宏业, 褚健

National Laboratory of Industrial Control Technology, Institute of Advanced Process Control, Zhejiang University, Hangzhou 310027, China

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**摘要** In compound fertilizer production, several quality variables need to be monitored and controlled simultaneously. It is very difficult to measure these variables on-line by existing instruments and sensors. So, soft-sensor technique becomes an indispensable method

to implement real-time quality control. In this article, a new model of multi-inputs multi-outputs (MIMO) soft-sensor, which is constructed based on hybrid modeling technique, is proposed for these interactional variables. Data-driven modeling method and simplified first principle modeling method are combined in this model. Data-driven modeling method based on limited memory partial least squares (LM-PLS) algorithm is used to build soft-sensor models for some secondary variables; then, the simplified first principle model is used to compute three primary variables on line. The proposed model has been used in practical process; the results indicate that the proposed model is precise and efficient, and it is possible to realize on line quality control for compound fertilizer process.

**关键词** [multi-inputs multi-outputs](#) [soft-sensor](#) [limited memory partial least squares](#) [simplified first principle model](#) [nutrient content of compound fertilizer](#)

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### MIMO soft-sensor model of nutrient content for compound fertilizer based on hybrid modeling technique

FU Yongfeng, SU Hongye, CHU Jian

National Laboratory of Industrial Control Technology, Institute of Advanced Process Control, Zhejiang University, Hangzhou 310027, China

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**Abstract** In compound fertilizer production, several quality variables need to be monitored and controlled simultaneously. It is very difficult to measure these variables on-line by existing instruments and sensors. So, soft-sensor technique becomes an indispensable method to implement real-time quality control. In this article, a new model of multi-inputs multi-outputs (MIMO) soft-sensor, which is constructed based on hybrid modeling technique, is proposed for these interactional variables. Data-driven modeling method and simplified first principle modeling method are combined in this model. Data-driven modeling method based on limited memory partial least squares (LM-PLS) algorithm is used to build soft-sensor models for some secondary variables; then, the simplified first principle model is used to compute three primary variables on line. The proposed model has been used in practical process; the results indicate that the proposed model is precise and efficient, and it is possible to realize on line quality control for compound fertilizer process.

**Key words** [multi-inputs multi-outputs](#); [soft-sensor](#); [limited memory partial least squares](#); [simplified first principle model](#); [nutrient content of compound fertilizer](#)

通讯作者:

傅永峰 [hysu@ipc.zju.edu.cn](mailto:hysu@ipc.zju.edu.cn)

作者个人主页: 傅永峰; 苏宏业; 褚健

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