

Application of a compound controller based on fuzzy control and support vector machine to ship' s boiler-turbine coordinated control system(PDF)

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Title: Application of a compound controller based on fuzzy control and support vector machine to ship' s boiler-turbine coordinated control system

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关键词: [ship boiler-turbine coordinated system](#); [support vector machine](#); [inverse control](#); [compound control](#)

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摘要: Multivariables, strong coupling, nonlinearity, and large delays characterize the boiler-turbine coordinated control systems for ship power equipment. To better deal with these conditions, a compound control strategy based on a support vector machine (SVM) with inverse identification was proposed and applied to research simulating coordinated control systems. This method combines SVM inverse control and fuzzy control, taking advantage of the merits of SVM inverse controls which can be designed easily and have high reliability, and those of fuzzy controls, which respond rapidly and have good anti-jamming capability and robustness. It ensures the controller can be controlled with near instantaneous adjustments to maintain a steady state, even if the SVM is not trained well. The simulation results show that the control quality of this fuzzy-SVM compound control algorithm is high, with good performance in dynamic response speed, static stability, restraint of overshoot, and robustness.

参考文献/REFERENCES

- [1] CRORTES C, VAPNIK V. Support vector networks[J]. Machine Learning, 1995,20: 273-297.
- [2] MULLER K R, SMOLA A J. Predicting time series with support vector machines[C]// GERSMER W, GERMOND A, et al. Proc of the International Conference on Artificial Neural Networks. Lausanne, 1997.
- [3] MUKHELJEE S, OSUUA E, GIRCSI F. Nonlinear prediction of chaotic time series using a support vector machine [C]//Principe J, Gile L, Morgan N, Wilson E. Neural Networks for Signal Processing VII-Proceedings of the 1997 IEEE Workshop. New York, USA, 1997.
- [4] DREZET P M, HAMISON R F. Support vector machines for system identification[C]// Proc of IACC International Conference on Control. Swansea, UK, 1998.
- [5] BROWN M, GUNN S R. Empirical data modeling algorithms: additive spline models and support vector machines[C]// Proc of IJACC International Conference on Control. Swansea, UK, 1998.
- [6] GUNN S R, BROWN M, SUPANOVA. A sparse, transparent modeling approach. Neural Networks for Signal Processing IX [C]//Proc of the 1999 IEEE Signal Processing Society Workshop. Copenhagen, Denmark, 1999.
- [7] HE Jun-feng, ZHANG Zeng-ke. Support vector machine inverse control of nonlinear discrete systems[J]. Journal of Tsinghua University (Science & Technology), 2005, 45(1): 100-102,106.
- [8] LIU Sheng, LI Yan-yan, DU Yan-chun. Internal model control for inverse system based on support vector machine and its

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application[C]//The 6th World Conference of Intelligent Control and Automation. Dalian, China, 2006.

[9] LIU Sheng, LI Yan-yan. A novel predictive control and its application on water level system of ship boiler

[C]//International Conference on Innovative Computing, Information and Control. Beijing, China, 2006.

[10] LIU Sheng, LI Yan-yan. Modeling research of the superheat system of boiler based on support vector machine[J].

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