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Author	矢頭, 攸介(Yazu, Yusuke)
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An Application of Adaptive System for the Study of Human Transfer Function

Yusuke YAZU*

An adaptive system is a recently developed method of automatic-control theory. The object of this thesis is an application of this method for the field of human engineering. By the aid of this new concept we can study the transfer function of human in tracking motion more precisely and positively in the sense of qualitative and quantitative analysis. The characteristics of the human control behavior such as nonlinearity, adaptability, fluctuation have been all neglected or assumed to be negligible as small factor. But without knowledge of these characteristics, better determination and designing of human-concerned control system can not be expected. The method that is applied to this thesis is parameter-perturbation method. This method is that at first small perturbation is introduced to the parameter of the system, then corresponding fluctuation occurs in the output, we use this fluctuation to determine the gradient of error index respect to the parameter and calculated gradient is used to decide how much and what direction to change the parameter for minimizing the error index. The method and caution of realizing this adaptation on the analog computer are discussed and block diagram is shown. To use this adaptive system for the determination of human transfer-function, we operate this system parallel to the human tracking system and make the system adjust its parameter for the minimizing difference between output of human tracking and output of the system. By this scheme we can determine the human transfer function. From the result of experiment adaptability to the input signal and long duration fluctuation of human transfer function are discussed.

*矢 頭 俊 介