SYNTHESIS OF ALGORITHMS FOR STABILIZATION OF THE LEVEL OF INTER-OPERATIVE BACKLOGS OF THE PRODUCTION FLOW LINE

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The report discusses methods for constructing algorithms for optimal stabilization of the value of inter-operational backlogs $[\chi]_0$ of the production flow line (Fig.1)[1]. Need to find a control action $u_0 \in G_U$, $u_0(t,S) << Y_0(t,S)$, $\left(S \in [0,S_d],\ t \in [0,T_d]\right)$, on the deviations $[y]_0 = [\chi]_0 - [\chi]_0^*$, $\left([y]_0(t,S) \in G_0,\ [y]_1(t,S) \in G_1\right)$, relatively unperturbed state $[\chi]_0^*$ for a given quality criterion of the transient process [2]

$$I = \int_0^\infty \frac{1}{S_d} \int_0^{S_d} u_0^2 dSdt,$$

$$u_0(t,S) = Y_0(t,S) - Y_0^*(t,S),$$

with differential dependencies

$$\frac{\partial [y]_0}{\partial t} = -\frac{\partial [y]_1}{\partial S} + q_{00} u_0,$$

$$\frac{\partial [y]_1}{\partial t} = -\frac{\partial [y]_1}{\partial S} B,$$

initial conditions

$$[y]_0(0,S) = [y]_{00}(S),\ [y]_1(0,S) = [y]_{11}(S),$$

and control objectives

$$\lim_{t\to\infty} [y]_0(t,S) = 0, \quad \lim_{t\to\infty} [y]_1(t,S) = 0,$$

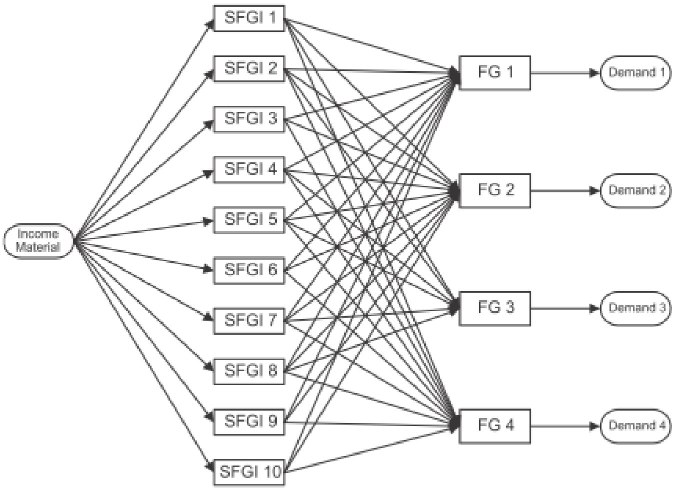

Fig. 1: Typical structure of a production line section

which will provide asymptotic stability of a given program state of the flow line parameters for the transition mode, determined by the Lyapunov function [3]

$$V^0\left(t,[y]_n\right) = \frac{1}{S_d} \int_0^{S_d} c_0 \left([y]_0(t,S)\right)^2 dS$$

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