Study and Simulation of the Model of Stability Measurement for Integrated Semiconductor Equipment

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Abstract—Performance analysis and capacity prediction of integrated semiconductor equipment is a very difficult task, it is an effective way to solve this problem by setting up a model of equipment performance measurement. This paper details the composition and related operation principle of parallel integrated semiconductor equipment. This paper also deriving composition and related operation principle of parallel equipment performance measurement. This paper details the is a effective way to solve this problem by setting up a model of integrated semiconductor equipment is a very difficult task, it is an effective way to solve this problem by setting up a model of equipment performance measurement. This paper details the composition and related operation principle of parallel integrated semiconductor equipment. This paper also deriving composition and related operation principle of parallel equipment performance measurement. 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wafer are less the chamber number N. The system enters the finish temporary stage.

(5) Unload stage. When all of the wafer is processed completely and loaded to wafer bearing the unload stage begins. At this time the wafer bearing chambers are pumped into air to atmosphere pressure. The robotic hand takes away all of the wafers from the wafer bearing chambers and the stage end.

Normally the time which the system in stable stage is longest and has the periodical characteristic. Thus the characteristics in stable stage can reflect the system characteristics. In the stable stage, the time which is the time interval of two successively finished wafers loaded in the wafer bearing chambers is called wafer basic period, represented by WFP, which is one the most important index to evaluate the equipment.

III. STABLE MEASUREMENT MODEL DESIGN

In order to evaluate the stability of the performance, a stable measurement model is designed. The method is as follows.

Consider the system

\[ E \dot{x}(t) = A_1 x(t) + A_2 x(t-h) + B \omega(t) \]
\[ y(t) = C x(t) \]
\[ \omega(t) = -\gamma(Hx(t)) \]

In the equations \( x \in \mathbb{R}^n \), \( y \in \mathbb{R}^m \), \( \omega \in \mathbb{R}^n \), constant matrix \( E, A_1, A_2 \in \mathbb{R}^{n \times n} \), \( B \in \mathbb{R}^{n \times m} \), \( C, H \in \mathbb{R}^{m \times n} \), and multi-variable nonlinear function \( \gamma(\cdot) : \mathbb{R}^n \rightarrow \mathbb{R}^n \) and \( \gamma(u) = (\gamma_1(u), \ldots, \gamma_m(u)) \), system observer is in the following format:

\[ \dot{\hat{x}}(t) = A_1 \hat{x}(t) + A_2 \hat{x}(t-h) + K (\gamma(t) - y(t)) \]
\[ \gamma(t) = C \hat{x}(t) \]
\[ \dot{\omega}(t) = \gamma(S (\gamma(t), y(t)) + H \hat{x}(t)) \]

The error observer system is:

\[ E e(t) = (A_1 + KC)e(t) + A_2 e(t-h) + B \dot{\omega}(t) \]
\[ \dot{\omega}(t) = \gamma(SCe(t) + H \hat{x}(t)) \]

In the equations, \( e(t) = x(t) - \hat{x}(t) \) is represented the actual wide meaning error and estimated wide system sates errors.

Out goal is to find corresponding dimension matrix \( S \) and \( K \) when \( t \rightarrow \infty \) make \( e(t) = 0 \) at this time we assume the system solutions in finite time is finite value.

Suppose \( u(t) = Hx(t), y(t) = S (\gamma(t) - y(t)) + H \hat{x}(t) \), the observation errors can be regarded as nonlinear feedback and regards \( \gamma(u(t)) = \gamma(v(t)) \) as the function of \( t \) and \( z(t) = u(t) - v(t) = (H + SC)e(t) \).

Assuming \( \psi(t,z(t)) = \gamma(u(t)) - \gamma(v(t)) \), it can be rewritten as:

\[ E e(t) = (A_1 + KC)e(t) + A_2 e(t-h) + B \Omega(t) \]
\[ z(t) = (H + SC)e(t) \]
\[ \Omega(t) = \psi(t,z(t)) \]

The components \( \psi(\cdot,\cdot) \) must satisfy following sector constrains

\[ \psi(t,z(t)) \] \[ \psi(t,z(t)) > 0 \] with \( \psi^T(t,z(t)) \) \( \psi(t,z(t)) \) \( Kz(t) \) \( < 0 \), the convergence of the observer is the conclusion of theorem 1.

At this time, state vector \( x(t) \) is replaced by \( e(t) \), output vector \( y(t) \) is replaced by \( z(t) \), the coefficient matrix \( A_2 \) is replaced by \( A_1 + KC \) and \( C \) is replaced by \( H + SC \). According to theorem 3, there exists positive definite matrix \( P, Q, R \) make LMI(9)(\( \Lambda < 0 \)) S can be solved by LMI(7) to get stability results.

IV. EXPERIMENT ANALYSIS

In order to verify the validity of the method the comparison experiment is applied for the stability experiment of some specific semiconductor system. The simulation is finished by a semiconductor equivalent circuit. The experimental circuit is as figure 1.
The following is the comparison of the stable effect diagrams of the semiconductor system measured by two different methods. The comparison diagrams are as figure 2.

In figure 2 the system temporary stable effect is obvious. The algorithm reduces the measurement model instability caused by the reference to ensure the accuracy of the results which has some practical value.

V. CONCLUSIONS

This paper detailed introduces the components and mechanism of parallel integrated semiconductor equipment. It deduces the integrated semiconductor stability measurement model to reflect the relationship between the stability and the output error. The throughput model can calculate the equipment stability effectively and aid the system design which can evaluate the system stability quickly.

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REFERENCES