ship. In addition to this, it frequently induces a lot of serious economic and ocean environmental damages. In order to avoid the engine failure a monitoring device is needed by way of detecting engine states. There are two types of engine monitoring systems which have been used for monitoring the engine operating states, such as oil mist detector type and bearing sensor type. One of them must be on board by the IMO (international maritime organization) rule and oil mist detector type is more attractive than bearing sensor type.

However, the conventional oil mist detectors take a simple structure which has only one pair of photo sensors to detect the opacities of oil mists within six or more crankcases of the engine. It consumes much time until it searches a failed crankcase, monitors an alarm level, and drives an alarm signal. Thus they may cause an instantaneous damage to the corresponding crankcase. That is, it has a shortage not to detect a failed crankcase in real time.

In this thesis, a method to reduce the overall time required for searching and monitoring of a failed crankcase of ship diesel engine is proposed. It is the method to detect the opacities of oil mists of crankcases of each engine compartment at the same time. In order to implement the suggested monitoring system, a new design structure is also suggested and implemented in view of hardware and software. It comprises five pairs of sensors and the corresponding mechanical structure. A prototype of the oil mist monitoring system for experiments is developed and it is used for the verification of the suggested method with the viewpoint of real time monitoring. In experiments the opacity of cigarette smog is used instead of that of oil mist because the generation of oil mist is very difficult in academic laboratory. The experimental results using smog are evaluated in qualitative sense and finally the overall conclusion is demonstrated.

68. A Study on the Speed Control of Medium-Speed Diesel Engines using a Fuzzy-PI Controller

제어계측공학과 김 영 일
지도교수 유 영 호

In the speed control system of diesel engines the controller tends to change from mechanical type to electronic type due to design requirements of its control performance. Recently, the usage of digital governors has been extended rapidly such that it can share various information with other control devices and monitoring systems. And the speed control algorithm used in a digital governor is mostly the PID control algorithm because it has advantage of easy embodiment. But speed characteristics of diesel engine is considerably nonlinear. Therefore, a countermeasure such as gain scheduling is incorporated to compensate it, because it cannot provide satisfactory performance over whole operation range with fixed PID gain. On the other hand, it is said that fuzzy control is robust against nonlinear, disturbances and modelling error of system. But it is difficult to get a satisfactory response with only fuzzy control in real systems.

In this thesis the fuzzy-PI controller that is combining advantages both of fuzzy and PID

control for the speed control of medium speed diesel engines is designed. And a set of experiments are carried out to confirm the effectiveness of the proposed control system with dedicated system implemented by Intel 80C196KC micro processor to Daewoo-MAN 6cyl. 1800[rpm] diesel engine driving 3[ψ], 220[V], 250[Kw] generator.

69. A Study on the Development of a Sunlight Collection System Using a Sensor Array Technique

제어계측공학과 서 승 원
지도교수 김 종 화

Nowadays, concerns about the discovery and the development of alternative energies are increased day by day, and naturally researches on the development of alternative energies are reported in every country of the world. Moreover, it is very important to find alternative energies in this country which has little resources. There are many types of energies which belong to alternative energy, such as solar energy, wave energy. wind energy, and so forth. Solar energy is one of the most attractive alternative energies for the future because it is clean, consistently supplied, and widely distributed throughout the earth. Especially, it has high potential to be used in this country which has much better daylights a year. By the way, the density of the solar energy is too low to use the solar energy directly. In order to use it effectively it must be needed to comprise a system to collect the sunlight. To comprise the sunlight collection system, first of all, a solar tracking system is necessary to track the sun during daylighting.

This thesis describes a sunlight collection system during daylighting which comprises a solar tracking element, sunlight collection element, and sunlight transmitting element. The most important element of them is the solar tracking element and this thesis proposes a new type solar tracking system which uses a full sensor method with a two-axis sensor array. And it also develops an algorithm which operates the overall system effectively. Especially, an algorithm called holding mode algorithm is developed to reduce the execution time for the real time tracking.

The developed system has the characteristic that it is applicable the place where the mounted base is moved or where the orientation is changed with time. Because the suggested solar tracking system tracks the sun only using the two-axis sensor array regardless of the information of the position.