

ABSTRACT

The design of a dynamic positioning system for a small boat based on variable structure control and visual-servoing is presented. Many control techniques have been investigated and the variable structure control was chosen, mainly, due the operation mode of the motor drivers installed on the boat applied in the experiments. The robustness of this control technique was also considered since the available dynamic model of the boat is uncertain. The design of the sliding surface is shown as well. Computer vision techniques were used to measure the position of the boat from images taken with a webcam, this kind of measure system was chosen due to its high accuracy and low cost. Simulation and experimental results of discrete time variable structure control with integral action of the boat's position, included in order to eliminate steady state error, are shown. To develop this controller four state estimators, in discrete time, are compared: derivative of position; asymptotic observer at a high sampling rate; asymptotic observer at webcam's sampling rate; and Kalman filter.

Keywords: Dynamic positioning. Variable structure control. State observer. Kalman Filter. Visual servoing.