

Rotary drilling systems are widely used in petroleum engineering to drill oil and gas wells. Control of drilling process is a very important topic because it allows industrials to optimize drilling cost, improve borehole quality, and protect equipment. Many researchers have dealt with the control of rotary drilling systems, wherein, the main difficulty is that the rock-bit interaction term is highly nonlinear, and mathematical models simulate its dynamic but with insufficient fidelity because of the lack of measurement devices for bottom torque for these systems. In order to design an efficient controller, it is mandatory to have the model highly loyal to the rotary drilling system, which can represent the dynamic of the system under the rock-bit interaction term. The objective of this study is to estimate the unknown input torque based on Kalman filter, the estimation has been validated on a test bench. Moreover, it has been noticed that Kalman estimator has better efficiency in comparison to the pole placement method. The algorithm has been implemented on CompactRio using LabView environment and applied to experimental equivalent system to rotary drilling system equipment