World Academy of Science, Engineering and Technology
International Journal of Mechanical and Mechatronics Engineering
Vol:17, No:06, 2023

RBF Neural Network Based Adaptive Robust Control for Bounded Position/Force Control of Bilateral Teleoperation Arms

Authors : Henni Mansour Abdelwaheb

Abstract : This study discusses the design of a bounded position/force feedback controller developed to ensure position and force tracking for bilateral teleoperation arms operating with variable delay, and actuator saturation. Also, an adaptive robust Radial Basis Function (RBF) neural network is used to estimate the environment torque. The parameters of the environment torque are then sent from the slave site to the master site as a non-power signal to avoid passivity problems. Moreover, a nonlinear function is applied to each controller term as a smooth saturation function, providing a bounded control signal and preserving the system's actuators. Lastly, the Lyapunov approach demonstrates the global stability of the controlled system, and numerical experiment results further confirm the validity of the presented strategy.

Keywords : teleoperation manipulators system, time-varying delay, actuator saturation, adaptive robust rbf neural network approximation, uncertainties
Conference Title : ICMRAE 2023 : International Conference on Mechanical, Robotics and Aerospace Engineering
Conference Location : Barcelona, Spain
Conference Dates : June 19-20, 2023