Adaptive Intelligent Control of the ABS Nonlinear Systems Using RBF Neural Network Based on K-Means Clustering

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Description
The anti-lock braking system (ABS) is an active safety system in road vehicles, which senses the slip value between the tyre and the road and utilizes these values to define the optimum braking force. Conventional control methods will not meet requirements due to uncertainties coming from vehicle dynamics and the high nonlinearity of the tyre and road interaction that are sources of instability. Therefore, we design an adaptive output feedback control methodology augmented via radial basis function neural network in order to force the slip dynamics to track a given smooth reference trajectory with bounded errors in the presence of high uncertainty. This result is achieved by extending the universal function approximation property of RBF NN together with the fast convergence of K-average clustering algorithm to model unknown system dynamics from input/output data. The effectiveness of the proposed control …