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Modelling and Simulation Of Peripheral Sensor Interface Transmission Channel Using Wave Digital Filters

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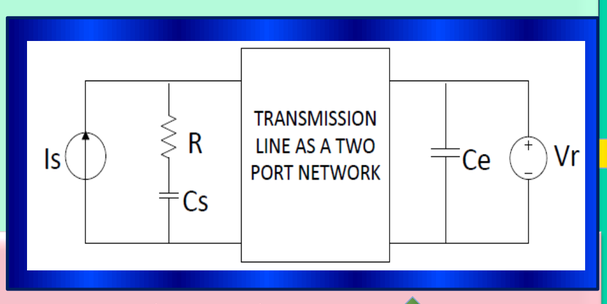
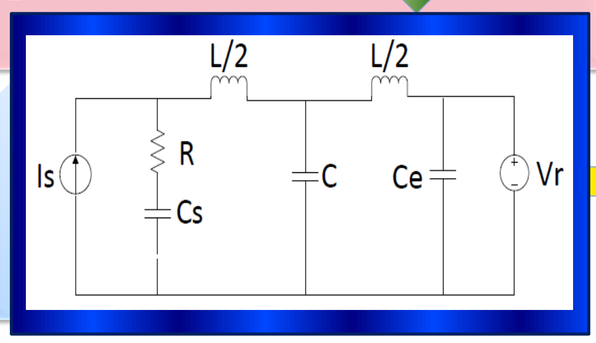
MOTIVATION

WAVE DIGITAL FILTERS (WDF)
Advantageous In Terms Of
- Coefficient Sensitivity
- Stability &
- Noise Performance

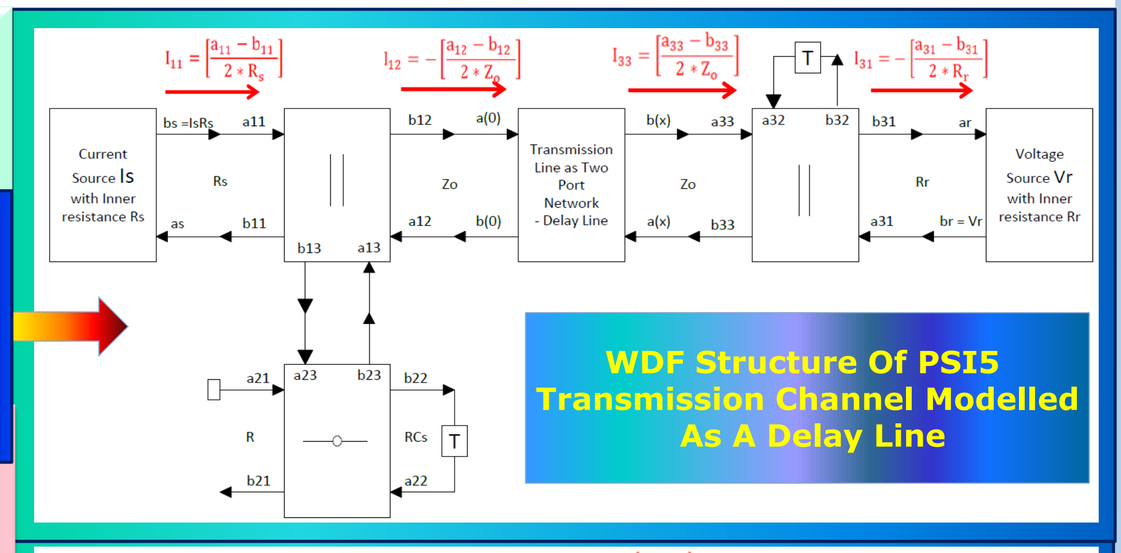


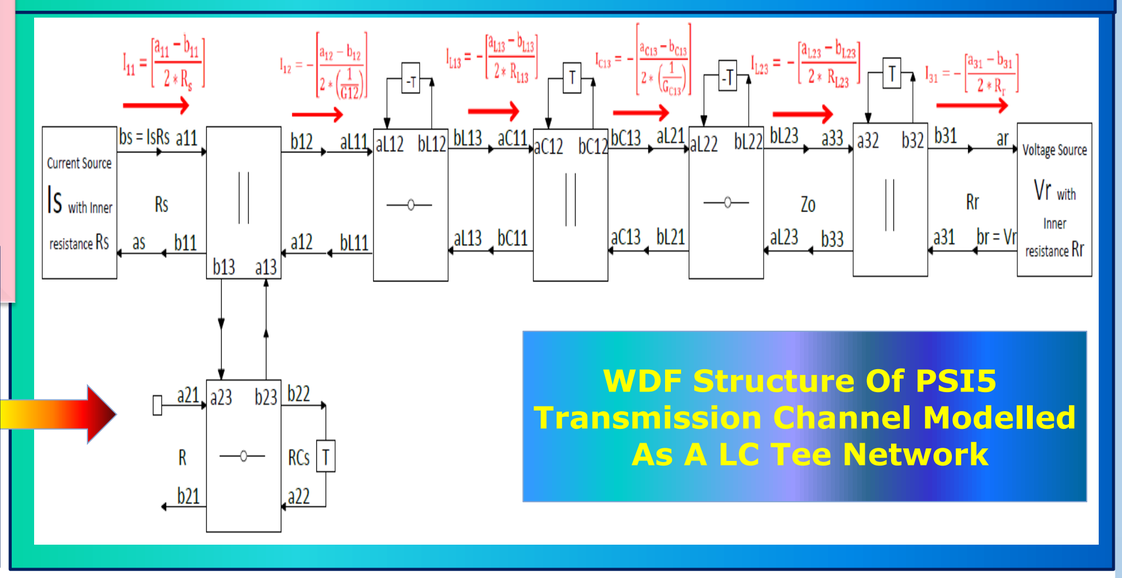
PERIPHERAL SENSOR INTERFACE (PSI5)
- Two Wire Current Interface
- Manchester Encoded Data Transmission
- Current modulated sensor signal
- Transmission speed 189kbps

Transmission Channel As Delay Line & LC Tee Network Is Implemented & Verified In MATLAB



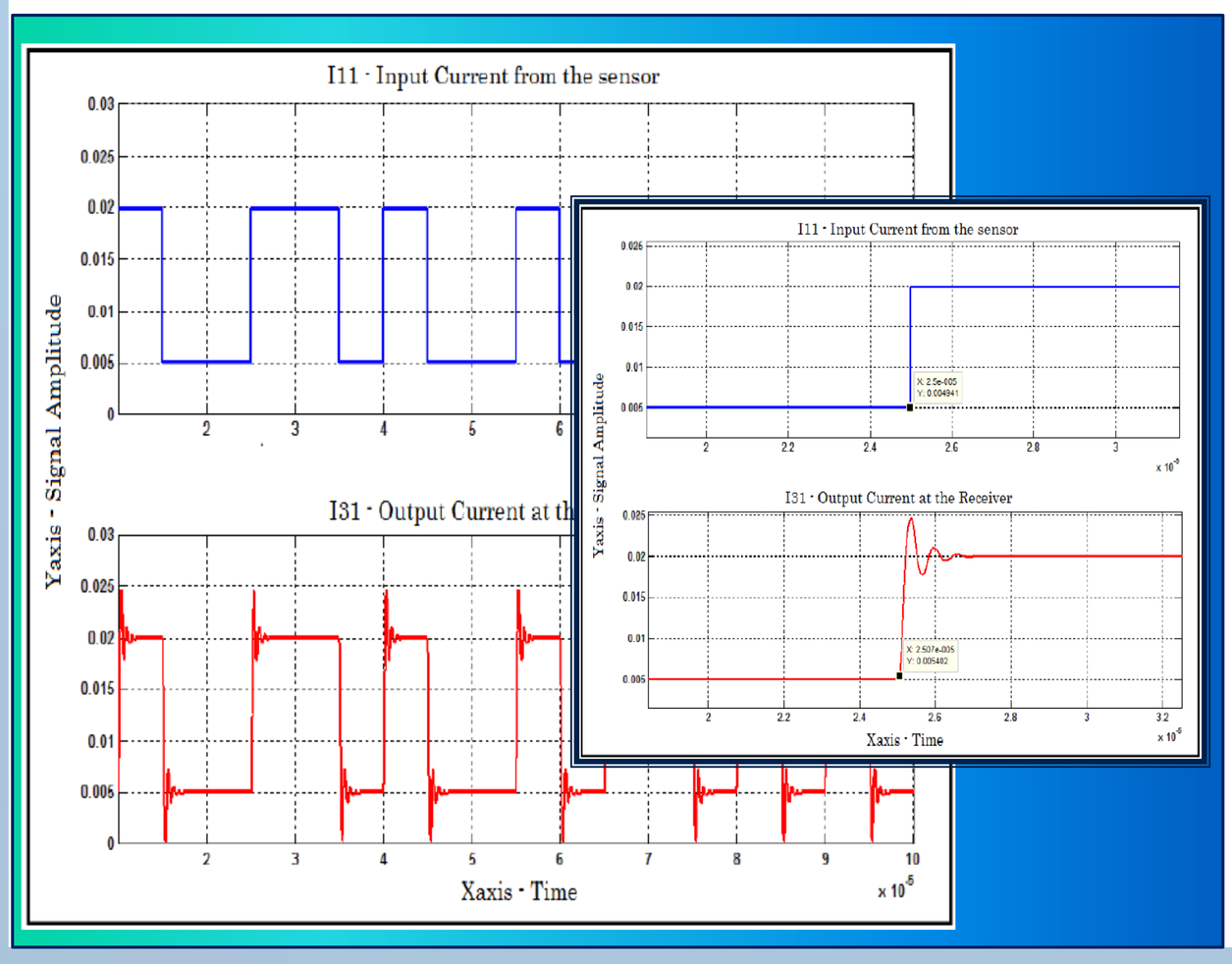
IMPLEMENTATION





RESULTS

Transmission Line Length = 12m;
Line Capacitance(c) = 50 pF/m
Line Inductance(l) = 731.667 nH/m
Theoretical Propagation Delay = 72.58ns
Simulation Result (in both scenarios) ~ 70ns



CONCLUSION

- A more stable and realistic discrete time PSI5 transmission channel model is modelled with the help of WDFs compared to the conventional digital filter structure.
- **Propagation Delay** of the simulated PSI5 transmission channel model matches closely with the theoretical propagation delay.
- An alternate PSI5 transmission channel model with the transmission line with an LC tee network confirms these results