

Two-stage Adaptive Interference Cancellers with Controlled Adaptation Intervals

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Research Area

Cancelling interference in signals - data sources - is a necessary component of the primary data processing, which allows to improve significantly the reliability and accuracy of processing results.

Adaptive filters are effectively used to cancel interference with varying characteristics, but classical adaptive filters do not allow canceling the interference correlated with desired signals.

The adaptive interference cancellers with adaptation during signal intermissions only make it possible to cancel the interference correlated with desired signals.

If the power level of interference exceeds the power level of the desired signals, effective cancelling of the interference is only possible for intermittent desired signals. This condition significantly limits the scope of application of this type of the adaptive interference cancellers.

The paper suggests an algorithm and a two-stage adaptive interference canceller implementing the algorithm in intermittent and pulsed signals, which makes it possible to cancel interference correlated with the desired signals even when the power level of the interference may significantly exceed the power level of the desired signals.

Two-stage Adaptive Interference Canceller

The first step of adaptive cancelling of correlated interference is implemented in the first stage, which is formed by the summation blocks $\Sigma_1, \Sigma_2, \Sigma_3$, the digital filter DF1, the computing device CD1, the control device CB and the white noise generator WNG.

The second step, i.e. complete adaptive interference cancelling using the intermissions calculated at the first step, is implemented in the second stage, which is formed by the summation unit Σ_4 , with the digital filter DF2 and the computing device CD2.

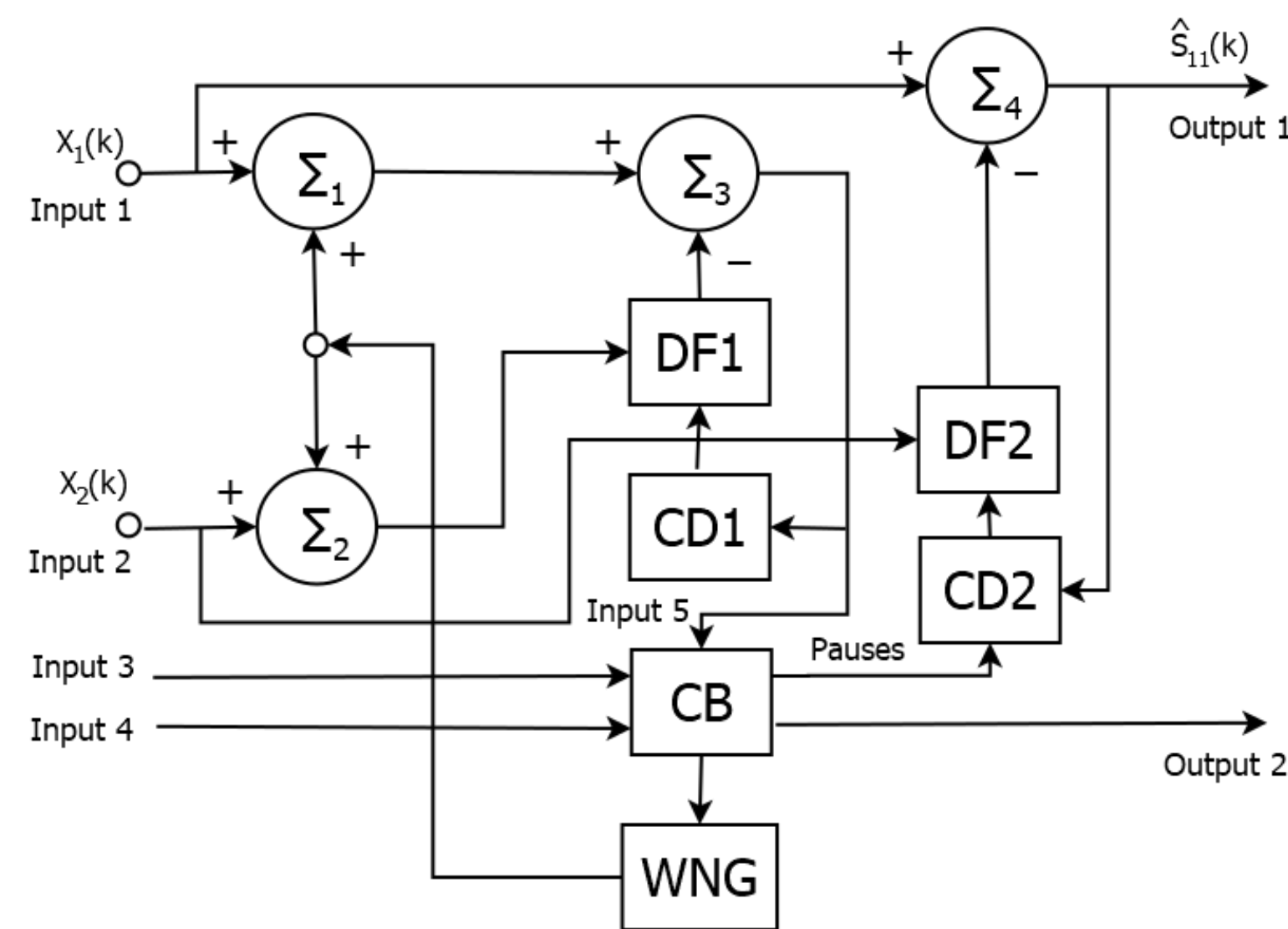


Fig.1. Block diagram of a two-stage adaptive interference canceller in intermittent and pulsed signals

Computer Simulation Results

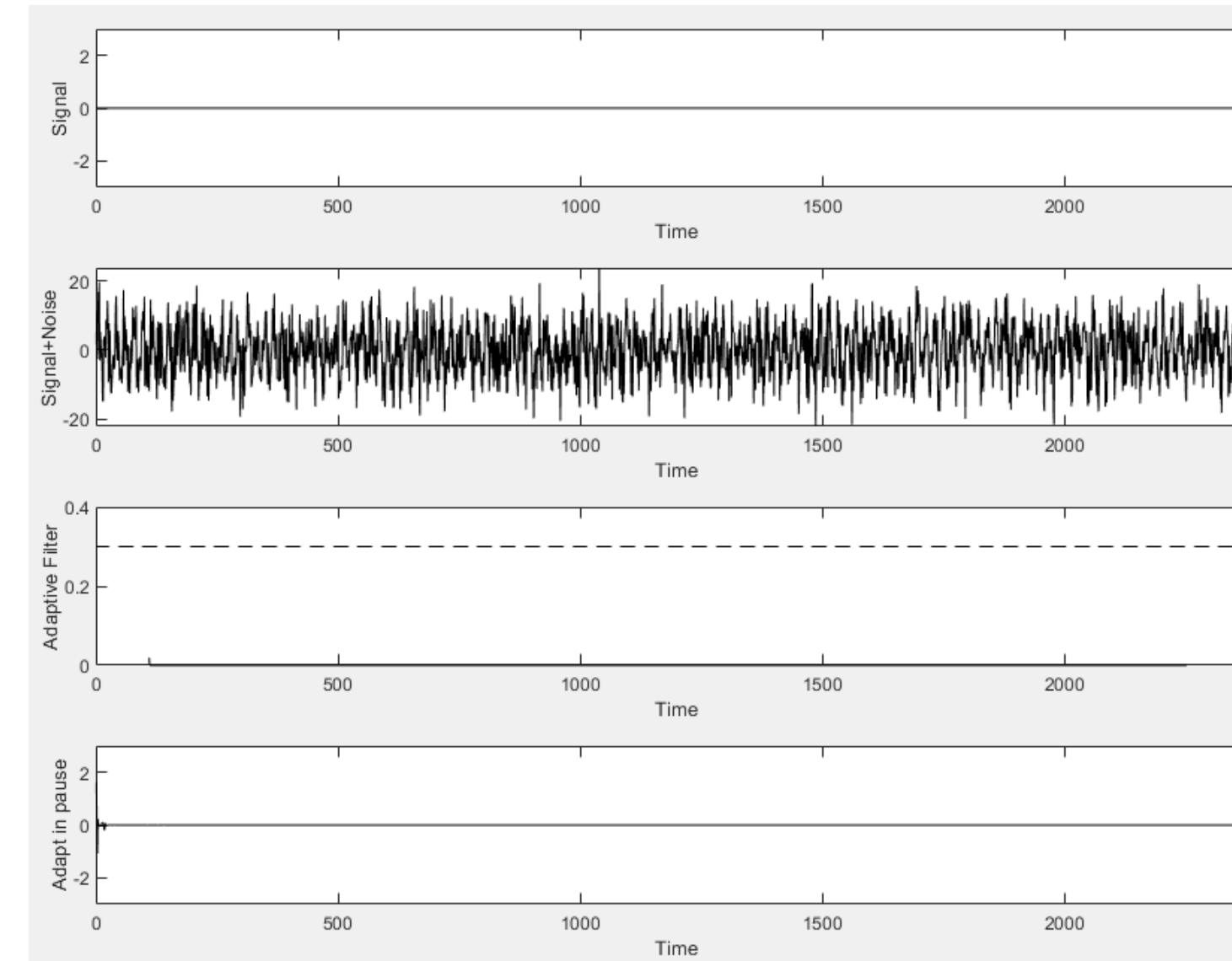


Fig.2. Results of computer simulation of interference cancelling by the two-stage adaptive interference canceller for the case of a zero desired signal.

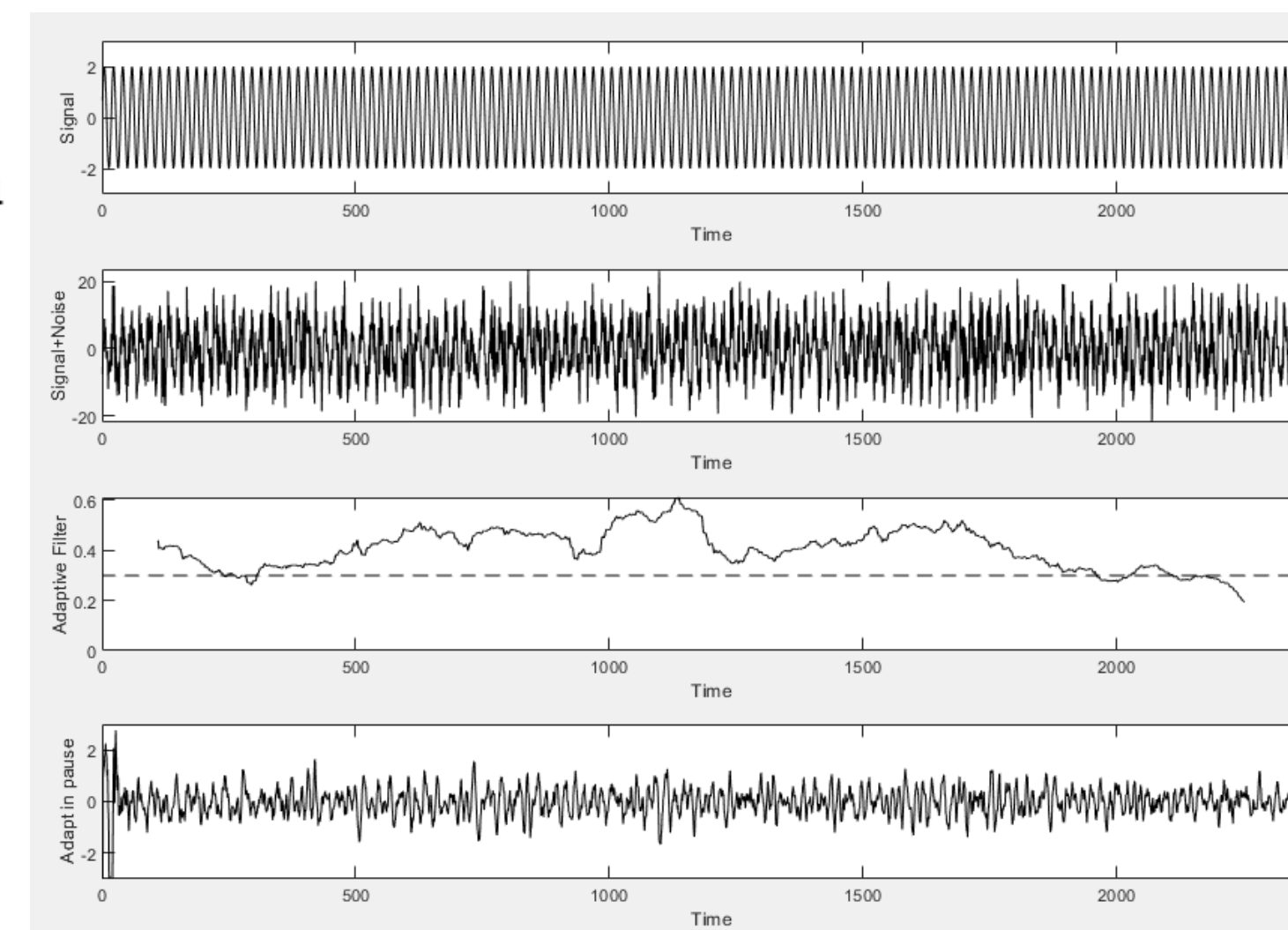


Fig.3. Results of computer simulation of interference cancelling by the two-stage adaptive interference canceller for the case of a zero desired signal.

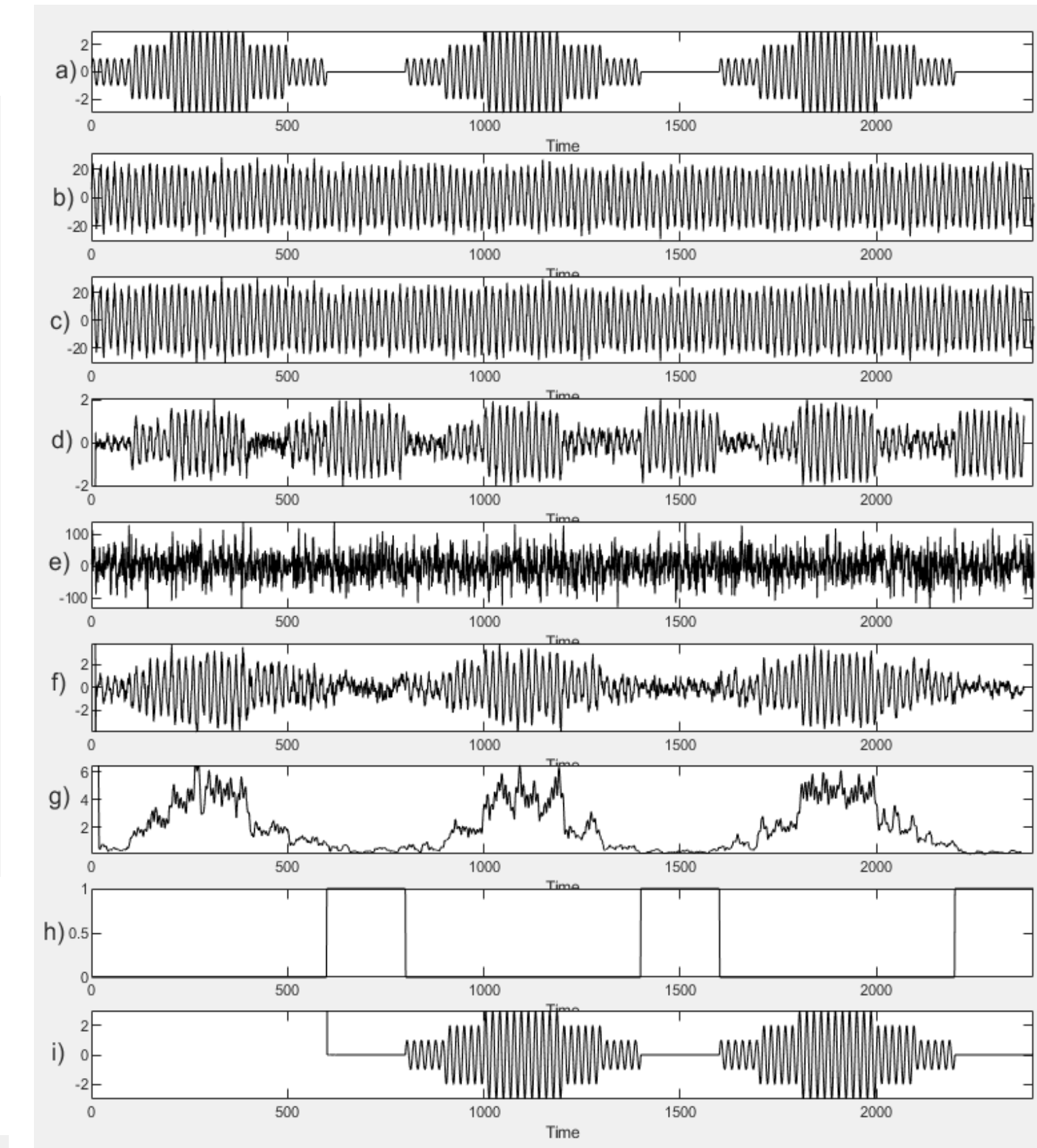


Fig.4. Results of computer simulation of interference cancelling by the two-stage adaptive interference canceller

Conclusions

An algorithm and a two-stage adaptive interference canceller implementing the algorithm in intermittent and pulsed signals have been developed.

The suggested adaptive interference canceller allows canceling the interference correlated with desired signals, the power level of which significantly exceeds the power level of the desired signals.

The results of computer simulation confirm the effectiveness of the proposed two-stage adaptive interference canceller.