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## Evaluation of the Feedback Effect on Filter Characteristics in Space Communication Systems

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**Abstract.** The paper proposes a study of the influence of destabilizing external factors on the characteristics of communication system filters synthesized based on multistage structures with a homogeneous basis. As the studied characteristics, the paper provides stability graphs of the frequency response of a bandpass filter with a change in the operating temperature and magnitude of the range of ratings of the passive components of the device circuit. Based on the analysis and study of the characteristics of two filter circuits: with and without negative feedback, an evaluation was made considering the increase in the stability of the filter in the frequency domain with the instabilities considered. To analyze the effect, an eighth-order Butterworth filter was synthesized, and the characteristics were analyzed using numerical modeling packages. The study shows that using a homogeneous basis in combination with feedback makes it possible to achieve a significant reduction in temperature instability and the effect of variations in element ratings on the central frequency and bandwidth of the filter. The results obtained confirm the effectiveness of using feedback nodes in order to increase the reliability of low-noise signal receivers in space communication systems and other areas requiring high parameter stability.

**Keywords:** active bandpass filter, bandpass filter with feedback, frequency response, temperature stability, filter design, homogeneous basis

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