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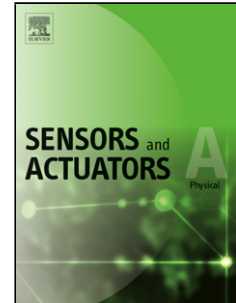
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## CYCLOSTATIONARY MODE OF PYROELECTRIC SENSOR

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### Highlights

- Pyroelectric system with a periodically time-varying load resistance is investigated.
- Difference between the conventional and cyclostationary modes of the sensor is found.
- Conditions providing the maximum amplitude of the output signals are obtained.

### Abstract

Periodically variable pyroelectric systems with a time-varying load resistance are investigated both theoretically and experimentally. The sensitive element of the system under consideration is periodically connected to the input of the measuring device. The processes of accumulation and redistribution of electric charges in this case are similar to those in pyroelectric vidicons. Theoretical analysis is based on the expansion of input time functions into a family of elementary signals, such as delta or unit step functions. In this case the response to an arbitrary signal can be calculated as a superposition of the elementary responses. Output signal of such sensors is represented by a periodical sequence of impulses under sinusoidal thermal excitation conditions, contrary to a sinusoidal signal in the case of stationary systems. Operating conditions under which the output signal amplitude exceeds the stationary response and is independent of the load resistance value are found.

**Keywords:** pyroelectric sensor, cyclostationary, pyroelectric vidicon, time-varying systems, noise.

### Introduction

It has been known that the temporal and frequency responses as well as threshold parameters of pyroelectric sensors depend strongly on their load resistance. Operating modes are of two main types:

1. Voltage mode whereby a load resistance is relatively large and hence the electric time constant of sensor exceeds the characteristic time parameters of incident radiation flux such as the modulation period or pulse duration.
2. Current mode whereby a load resistance is small and the sensor electric time constant is less than time parameters of the flux.

Pyroelectric devices are stationary systems with time-independent parameters in the above limit cases as well as in the borderline ones. A detailed description of pyroelectric devices,

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