European Journal of Emerging Technology and Discoveries
ISSN (E): 2938-3617
Volume 1, Issue 7, October, 2023.

MATHEMATICAL MODELS OF HALF-RING PHOTORESISTIVE CONVERTERS OF VANE TURNING ANGLES

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Abstract
In the design of the heat exchanger for flows, the turning rod of the vane is located between the fixed upper and lower half-ring photoresistors connected to the ring pushed 90 degrees from each other, and between the ring radiation sources and receivers, fixed to the wall of the vane, there are two identical half-disc optical screens, which are covered with a constant ring radiation source.

Keywords: aileron pivot, and half-ring photoresistors, turning angle, two identical half-disc optical screens.

Introduction

Figure 1 shows the structure of the , and OE optical screens included in the hybrid converter.

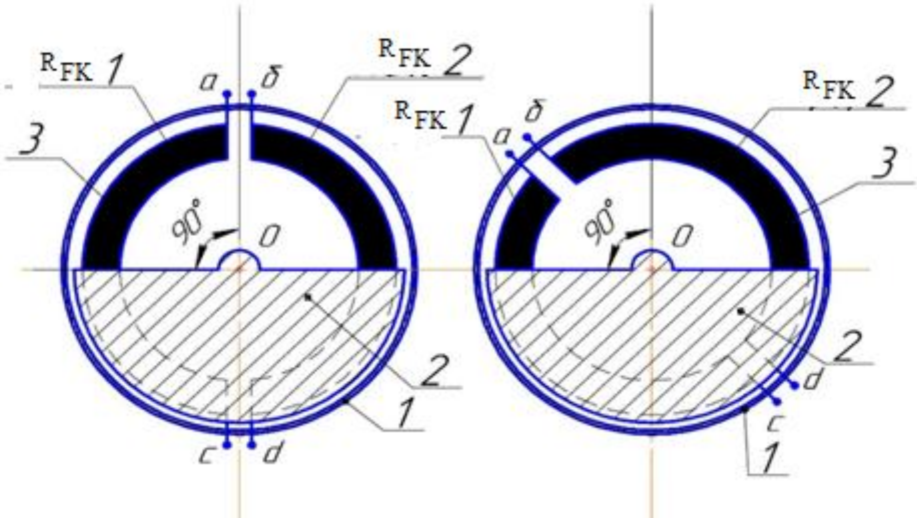

Figure 1.

In the initial state $\varphi_{б} = 0\, \varphi_{б} = 0$ at the turning angle $R_{F1}R_{\Phi1}$ ва $R_{F2}R_{\Phi2}$ the half-ring photoresistor is illuminated and darkened uniformly through the optical screen, and their total resistance is equal to and shoulders $R_{F1}R_{\Phi1}$ ва $R_{\Phi2}$ the output voltage at the output of a bridge circuit with a half-loop photoresistor connected $U_{exit} = 0$ will be.
Relative optical resistance per unit angle of rotation $r_{YoR}r_{ёр}$ and opposite in the shade r_{shadow} we enter:

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$$r_{yor} = \frac{R_{yor}}{180} \tag{1}$$

$$r_{shadow} = \frac{R_{hadow}}{180} \; r_{соя} = \frac{R_{соя}}{180} \tag{2}$$

Angle of rotation in the initial position $\varphi_б = 0$ when:

$$R_{FK1} = r_{shadow} \cdot 90 + r_{shadow} \cdot 90 \tag{3}$$

$$R_{FK2} = r_{shadow} \cdot 90 + r_{shadow} \cdot 90 \tag{4}$$

Switch $\varphi_б$ $\varphi_б$ when turning the corner clockwise, R_{F1} the photoresist comes out from under the optical screen OE and its illuminated area increases, $R_{F2}R_{Ф2}$ photoresistor reduces its illuminated area and photoresistor ΔR_{F1} ва ΔR_{F2} differences change according to the following formulas [65, 66]:

$$\Delta R_{FK1} = \phi_б \left(r_{yor} - r_{shadow} \right) \tag{5}$$

$$\Delta R_{FK2} = \phi_б \left(r_{shadow} - r_{yor} \right) \tag{6}$$

To the shoulders R_{F1} and R_{F2} The output voltage of the photoresistor-connected bridge circuit is found from the following expression:

$$U_{out} = U_M \frac{2 \cdot K \cdot \phi \left(r_{yor} - r_{shadow} \right)}{(K+1)^2 \left(r_{shadow} - r_{yor} \right) 90} \tag{7}$$

According to the developed hybrid converter, in the construction of Figure 2, the upper half-ring photoresistors 10 and 11 and the lower similar half-ring photoresistors are shifted by 90 degrees from each other. Experimental studies of semi-ring photoresistors 10 and 11 in the movement of the optical screen in the range from -90 to +90 degrees are presented in Figure 2.

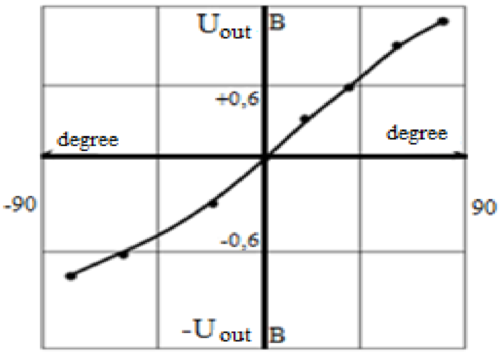

Figure 2.

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