

Chapter 4

Transmission of Two Measuring Signals by an Invariant Property of Three Wire Communication Lines



Alexander Penin and Anatolie Sidorenko

Abstract The invariant relationship between the sets of load conductivity values and the corresponding values of the input currents of the two or three wire communication lines is shown. This relationship does not depend on parameters of the lines and the accuracy of measuring devices. It allows transmitting signals in the analog form of different physical sensors for monitoring technical or natural objects.

Keywords Communication line · Resistive sensor · Projective transformation · Cross ratio · Projective coordinates

4.1 Introduction

Different sensors of physical values are used for monitoring technical or natural objects. For these usually remote devices, it is necessary to provide of transmission of measuring signals [1], for example, by multi-wire line [2]. At present time, methods for transmission of discrete electrical signals in binary code are used. These methods are known as the RS-485 and MicroLAN interfaces. Low noise immunity is a disadvantage of the known methods. Therefore, researches and elaborations of systems for transmitting discrete electrical signals in the analog form with improved noise immunity are important [3–5]. But, two dedicated communication lines are necessary for transfer of two signals. Point is that longitudinal and lateral resistances (conductivities) of actual lines do not allow using the common wire so as to apply the more economical three-wire lines.

The theoretical researches show that invariant relationship takes place between the sets of load conductivity values and the corresponding values of the input currents of

A. Penin (✉)

D. Ghitu Institute of Electronic Engineering and Nanotechnologies, Chisinau, Moldova

A. Sidorenko

D. Ghitu Institute of Electronic Engineering and Nanotechnologies, Chisinau, Moldova

I.S. Turgenev Orel State University, Orel, Russia

© Springer Nature B.V. 2020

A. Sidorenko, H. Hahn (eds.), *Functional Nanostructures and Sensors for CBRN Defence and Environmental Safety and Security*, NATO Science for Peace and Security Series C: Environmental Security, https://doi.org/10.1007/978-94-024-1909-2_4

65