



AN INVERSE LINEARIZATION MODEL FOR THE CHARACTERIZATION OF NON-CONTACT THERMOPILES

J-S. Botero V.¹ A. Salazar^{1,2} and L-J. Morantes G.¹

¹Grupo de investigación AEyCC

¹Facultad de Ingenierías, Instituto Tecnológico Metropolitano ITM,
Carrera 31 No. 54-10, Medellín, Colombia.

²Departamento de Ingeniería Electrónica y de Telecomunicaciones
Facultad de Ingeniería, Universidad de Antioquia UdeA
Calle 70 No. 52-21, Medellín, Colombia

Email: juanbotero@itm.edu.co, luismorantes@itm.edu.co, augusto.salazar@udea.edu.co

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Abstract- A thermopile is an electronic device that converts thermal energy into electrical energy by means of arrangements of thermocouples that are connected in series. In addition, optical filters restrict the wavelength that strikes the thermopile. One of the main advantages of using a thermopile is its sensitivity to infrared radiation, which allows implementing non-contact thermometers. However, the thermopile does not provide an absolute temperature value, but a value that is proportional to the temperature gradient between the local temperature in the measurement range of the thermopile and its internal temperature. Therefore, it is necessary to integrate temperature sensors aiming to correct the output temperature value. In this sense, the output of the thermopile corresponds to a value generated from the relationship between the internal temperature of the thermopile and the output temperature. This work proposes and evaluates a thermopile characterization model, which uses an incubation system and a thermoelectric cooling device to control the room temperature and the temperature that is read out using the thermopile, respectively. This is based on the automation of the data collection procedure and the characterization of the thermistor that is used to measure the temperature of the thermopile. The result is an experimental operating surface, from which a linearization model was derived.

Index terms: Linearization, non-contact, thermopile, Peltier effect, thermistor.