

Technological Process Identification Method for Accelerometers MEMS

Igor Nevlyudov, Vladyslav Yevsieiev,
Svitlana Miliutina, Viktoriia Bortnikova

Kharkiv National University of Radio Electronics
viktoriia.bortnikova@nure.ua

I. INTRODUCTION

For CAM system development it is necessary to classify and to develop an accelerometers production technological process identification method. It is based on proposed decomposition model [1].

II. IDENTIFICATION METHOD DEVELOPMENT

We propose to use hierarchical clustering method for accelerometers classification. For this task solution we analyzed modern accelerometers MEMS by PCB Piezotronics, Inc. [2]. The matrix Ak (82×34) is complicated. There are 82 accelerometers and 34 main parameters. They represent accelerometers and their parameters set. We determined distance between vectors $Ak_1 \dots Ak_{82}$ for hierarchical tree of accelerometers MEMS classification with the help of Euclidean metric. Then we formulated accelerometers MEMS hierarchical tree using next neighbor algorithm. Input information is vector of distance between pairs of accelerometers $Ak_1 \dots Ak_{82}$ in multi-dimension space. So. We got a matrix Z , contains information about cluster's tree. Z dimension is equal to $(m-1) \times 3$, where m – accelerometers number.

Entire data set accelerometers $Ak_1 \dots Ak_{82}$ are end nodes of cluster tree. They are numbered from 1 to m . End nodes are single clusters. They are united into clusters by overlying tree nodes. i -th string of matrix Z corresponds to each next overlying tree node. Rows 1 and 2 of matrix Z contain accelerometers indexes, connected to new cluster. Formed cluster number will be equal to $(m-1)$. 3-rd row of matrix Z contains distances between pairs of objects united into clusters.

Basing on proposed accelerometers MEMS classification modeling was executed/ Resulting dendrogram is shown on Fig.1.

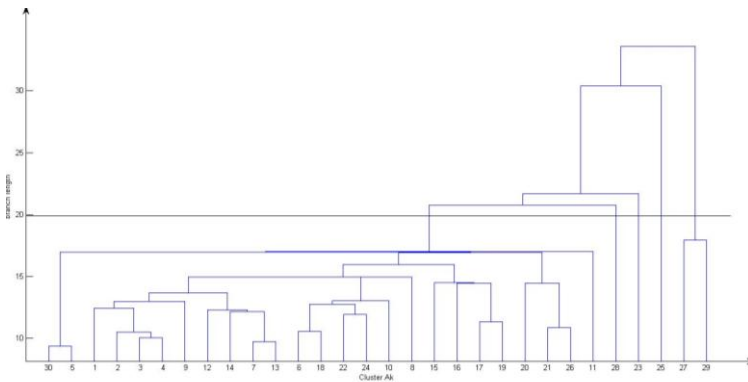


Fig.1 Resulting Dendrogram

Basing on resulting dendrogram we can switch 5 clusters. An accelerometers group belongs to each of them. It gives an opportunity to identify percentage of their inherent production technological processes.

CONCLUSION

Proposed identification method allows to simplify a technological process choice for accelerometers MEMS design.

REFERENCES

- [1] Nevlyudov I. Accelerometer parameters decomposition model for technological process design automation / I. Nevlyudov, V. Yeysieiev, S. Miliutina, V.Bortnikova // Visnik Natsionalnogo universitetu « Lvivska politehnika », № 828. Seriya: Kompyuterni sistemi proektuvannya. Teoriya i praktika. – Lviv: Vidavnistvo Lvivskoyi politehniki, 2015. – 1-92 p. – P. 11-15.
- [2] Accelerometer //Specifications of products URL: <http://www.pcb.com/TestMeasurement/Accelerometers> (date :12.09.2016).