Summary of PhD Thesis

Methods of multidimensional data processing for damage detection in mining machines

MSc. Eng. Jacek Wodecki

Considering progressing automation of industrial processes, automated damage detection in mining machines is of increasing demand in modern raw materials industry. Progressing efficiency and precision of data processing algorithms allows for early damage detection, as well as more aware planning of maintenance and inspection. In case of real-life analysis signal registered during machine operation, it is necessary to take into consideration the presence of various components (random as well as deterministic) that obstruct the access to desired information. Hence, author has moved towards exploitation of multidimensional analytical techniques, that enable in-depth analysis, allowing to unravel hidden information.

The described problem has been approached from two different angles: the analysis of multichannel records, or using techniques based on multidimensional data representations. In the first case, feature extraction methods were used together with data fusion approach to describe the anomalous behavior as one of the components present within a signal from a deterministic point of view. On the other hand, multidimensional data representations were applied to individual signals to be able to describe them in terms of extended domains, and then use multidimensional analytical techniques to process them and discover unexpected behaviors from a statistical point of view.