

T01. Chemometric in Civil Engineering

A. Sulejmanov

Kazan State University of Architecture and Engineering, Kazan, Russia

Keywords: optimization of construction composite material, degradation, PLS models

Multivariate approach (MVA) for data processing has shown its great efficiency in various applications both in chemistry and biology. The complexity of objects and problems in civil engineering also requires modern MVA for data analysis. An engineer is increasingly faced with need to use mathematical and statistical methods in everyday practice. MVA in general and chemometric methods in particular may essentially enhance the capability of newer, mostly multicomponent, methods. Applications of various chemometric techniques should give possibility for efficient investigations in different areas such as:

- monitoring of historical buildings with non-intrusive measurements (image analysis, acoustic and ultrasonic probing);
- estimation of heterogeneity in concrete slabs, identification of the substrate defects on painted slates, etc. (novel methods of texture analysis);
- ecological analysis of pollution; (PCA, PLS and N-way methods);
- analysis of aging and degradation of various materials (multivariate projection methods);
- quantitative structure—property relationship (PCA).

First attempts of chemometric applications in the KSUAE are presented in this conference. They are: optimization of construction composite material by nonlinear PCR and study of aging and degradation of PVC films with the help of soft models. The latter problem is presented in details.

The samples of PVC soft jackets of various thickness, colour, and light absorbers were exposed for the accelerated aging. PCA helps to reveal main properties of initial material that influence on degradation and correlation between the mechanical and colour characteristics in the course of aging. PLS models show the possibility to substitute a time consuming mechanical testing by quick and cheap colour analysis.