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COMMUNICATIVE TEACHING METHODS IN TECHNICAL EDUCATION: INTEGRATIVE APPROACH

Lemeshchenko-Lagoda V.V., teacher

Tel .: +38 (098) 171-33-76, e-mail: viktorii.lemeshchenko-lagoda@tsatu.edu.ua

Movchan S.I., PhD, Associate Professor,

Chairman of the Pryazovie River Basin Council

Tel .: +38 (067) 386-95-44, e-mail: serhii.movchan@tsatu.edu.ua

Dmytro Motorny Tavria State Agrotechnological University, Melitopol, Ukraine.

Abstract. *Based on the active usage of developed engineering solutions for studying the field of "Architecture and Construction", in order to consider the theoretical material in-depth, it is proposed to use the CLIL method, tested by the authors while teaching other related disciplines.*

The use of the CLIL methodology, which extends the communication conditions for the use and study of a foreign language, involves the presentation of some key issues in a foreign language, and the use of the same test questions in compiling a training package.

Keywords: *optical-mechanical systems, laser, laser emitter, communication conditions, CLIL.*

Introduction. The main purpose of the study of engineering disciplines is the comprehensive training of a specialist who is able on the basis of the acquired knowledge and skills to perform the necessary production tasks, solve problems, actively interact with foreign colleagues in order to find solutions. That is why the main attention in the future specialists training should be focused on the developing creative and critical thinking skills, and at the same time the developing of foreign language competence. The use of the proposed technique contributes to the fulfilling of this task.

The main content. When studying optical methods of aqueous solutions, students first get acquainted with the course of research works of the liquid substances, technological control of their parameters. They also learn that according to the nature of the main effects used in analyzers, all devices can be divided into the following groups: mechanical analyzers (determine hydraulic, consumable and other characteristics), thermal analyzers (thermal and related volumetric parameters), optical analyzers, radiospectrometric (different types of resonance in nature), electrochemical (change of EMF (electromotive force) and other electrical characteristics) and radioisotope (absorbs and scattering ability).

For the study of the first and second groups of impurities, with particle size (diameter) from 10^{-3} to 10^{-8} mm, a conditional classification of the developed optical methods is presented in the Fig. 1.

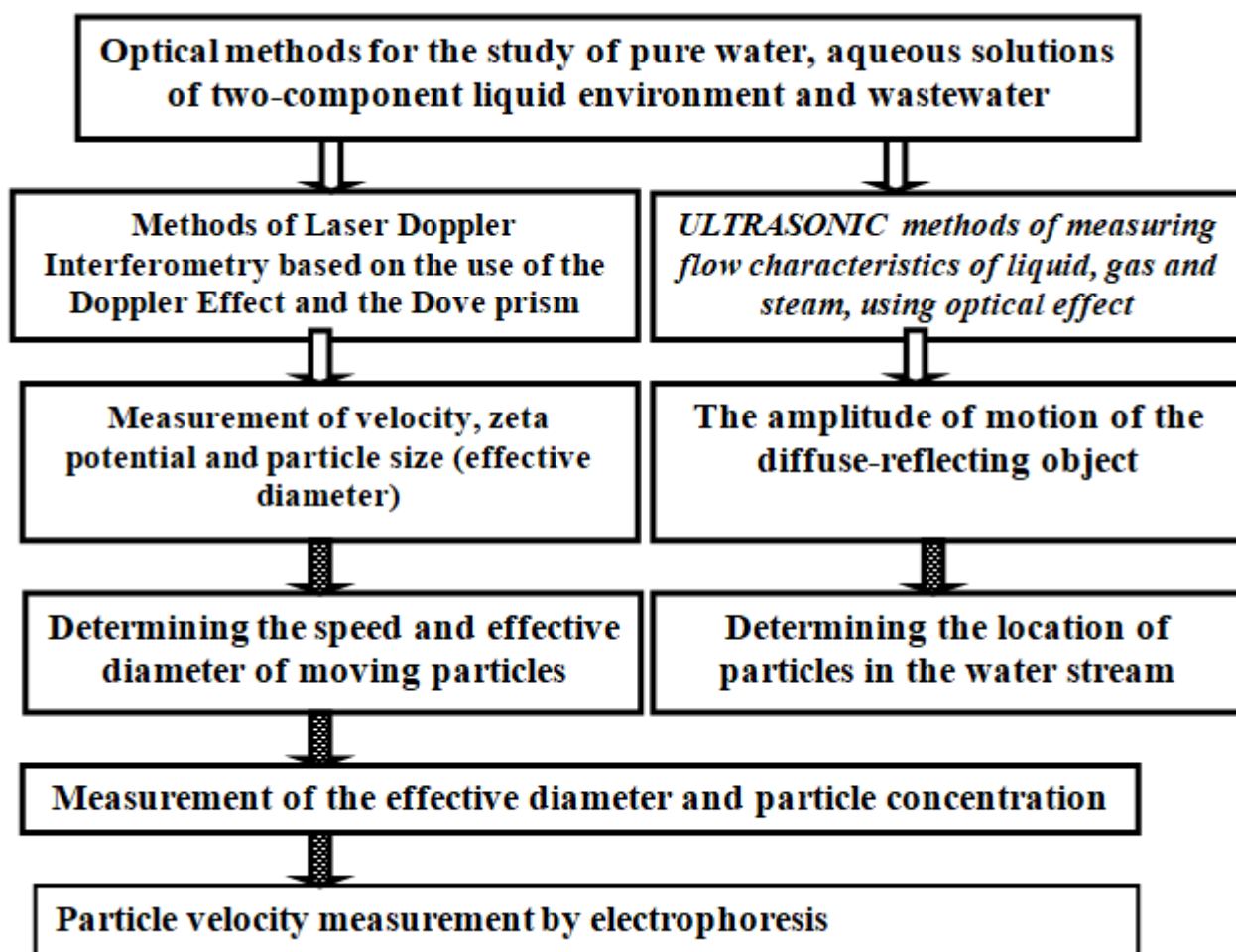


Fig. 1. Classification of optical methods for the study and control of liquid substances, wastewater and other aqueous solutions

After that, the authors' own works are presented, that is done to promote students' creative thinking. Thus, in order to increase the accuracy of measurement and determination of hydromechanical parameters and characteristics of particles of aqueous solutions moving during electrophoresis, a new design solution was developed using additional elements. Installed new structural elements create the conditions for more accurate measurement and, most importantly, the location of particles in the flow of aqueous solution in some cases.

Students get acquainted with the proposed device for measuring hydromechanical parameters of aqueous solution particles by electrophoresis, which determines four Doppler frequencies of the corresponding signal, which correspond to four consecutive positions of interference bands and calculate hydromechanical parameters of aqueous solution particles.

Fig. 2 shows a block diagram of a device for measuring the hydromechanical parameters of aqueous solutions particles by electrophoresis [№102915].

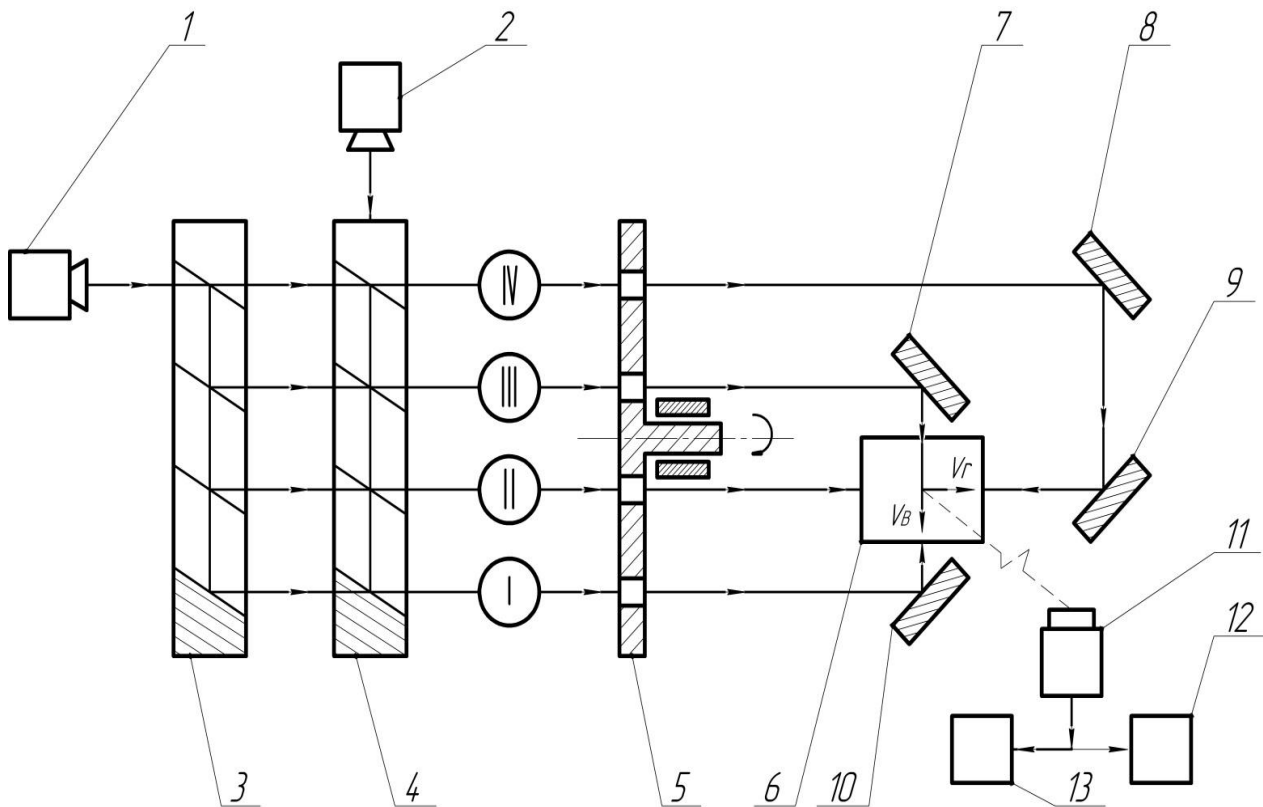


Fig. 2. Device for measuring hydromechanical parameters of aqueous solutions particles during electrophoresis [4]: 1, 2 - sources of coherent radiation (LGN - 222); 3, 4 - light dividers; 5 - electromechanical modulator; 6 - electrophoretic chamber; 7, 8, 9, 10 - mirrors; 11 - photodetector (FEP 84-5); 12 - oscilloscope (C 9-8); 13 - personal computer (PC).

The electromechanical modulator (Fig. 3) is made with three coaxial disks, each of which has four holes that allow you to illuminate the cell at the same time with two beams from each laser, located on each modulator every 90° .

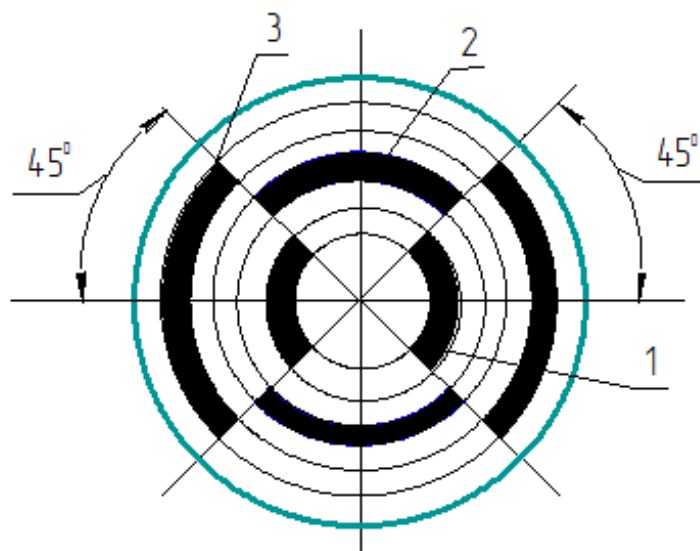


Fig. 3. General view of the electromechanical modulator with four inputs: 1, 2, 3 - coaxial holes of the modulator housing.

Thus, the purpose of development and use of optoelectric systems is to increase the accuracy, sensitivity and efficiency of measuring hydromechanical parameters and characteristics of particles of impurities of aqueous solutions, technical fluids, other real liquids and solutions. The use of additional devices in the measurement system of ADC,

PC, etc. provides automation of measurement in real time.

Once the topic is covered, students have the opportunity to expand their knowledge by reading additional materials presented in a foreign language. Thus, the use of the CLIL methodology involves the gradual integration of a foreign language into the process of studying professional disciplines, allows to solve several interrelated problems and tasks.

Conclusions and suggestions. 1. The study of a foreign language, for in-depth knowledge of a professional, special discipline, provides constant communication conditions throughout the period of education. For example, four years, for obtaining a "Bachelor" degree.

2. Taking into account the experience of teaching other, related disciplines, it is advisable to translate into a foreign language not all the material, only its share, the key points that determine the essence of the process being studied.

3. In addition, the study of the technical condition of the issue occurs together with the acquisition of professional competencies in a foreign language, which has a positive effect on the spread of worldview in their specialty.

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