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MOTORIZED FOCUS DRIVERS FOR DIGITAL MICROSCOPES

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Digital microscopes have become increasingly popular in various fields, such as biological research, medical diagnostics, and materials science, due to their ability to capture high-resolution images of microscopic structures [1-5]. One of the most critical components of a motorized digital microscope is a focus driver, which allows for precise control of the distance between the objective lens and the specimen. Motorized focus can also be combined with other automation features, such as autofocus units, motorized stages for specimen, motorized illumination units with optical filters and, etc. There are several types of motorized focus drivers that are commonly used in digital microscopes: servo, step, and piezo motor drivers [1-3].

Servo motor drivers use direct current motors, linear or rotation encoders and feedback loop to continuously adjust the position of the objective lens until it reaches the desired focus point. They are ideal for applications that require fast and precise focusing. Advantages of servo motor drivers are high speed, smooth movements, and good accuracy. The disadvantages are high price and complexity.

Step motor drivers can be programmed to move with definite increments. Their advantages are sufficient precision and repeatability, simple control, and compatibility with digital electronics. The disadvantages are noise and vibration.

Piezo motor drivers are incredibly precise, very stable and can fix the current position without power supply. On the other side, they are slow and very expensive.

The important parameters such as the range and speed of focusing, and the positioning accuracy and repeatability have to be considered for selection of focus driver.

Keywords: digital microscopy, focus driver, motorized focus, piezo-based focus.

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POLARIZATION CONTRASTS DETECTION WITH TELEVISION-TYPE SYSTEMS

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Until recently, the use of polarimetric methods in remote sensing was limited mainly to meteorological problems. Now such methods of analysis are increasingly being introduced into the solution of security and military tasks. In such tasks, one of the most important factors in the effectiveness of surveillance systems is the ability to work in real time. That is, the methods of information processing must be compatible on the time scale with the receipt of a television image by the operator [1].

Complete analysis of the type and degree of radiation polarization is carried out using polarimeters. These methods are based on the use of a sequential combination of phase plates and polarizers (Fig.) [2]

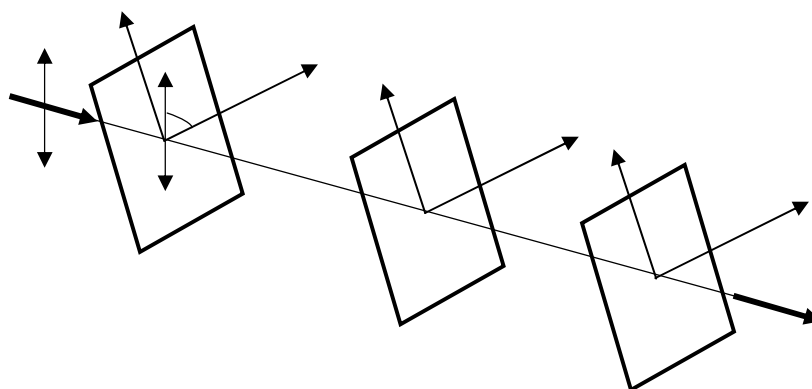


Fig. An optical setup for polarization analysis: 1, 3 - quarter wave plate, 2 – linear polarizer

Rotation through certain angles of these elements makes it possible to estimate the state of polarization at the output of the elements over the entire Poincaré sphere by determining the corresponding coefficients. Mechanical rotation and calculation of