# MATRIX METHODS IN DIFFERENTIATION OF FIBRILLAR NETWORKS OF BIOLOGICAL TISSUES WITH DIFFERENT PHASE AND AMPLITUDE ANISOTROPY

Yu.O. Ushenko[*], A.V. Dubolazov, V.O. Ushenko, M.P. Gorsky, V.P. Zhytaryuk

*Correlation Optics  Department, Chernivtsi National University,*
*2 Kotsyubinskogo Str., Chernivtsi, Ukraine*
*E-mail: yuriyu@gmail.com

The optical model of polycrystalline networks of myometrium is suggested. The results of investigating the interrelation between the values correlation (correlation area, asymmetry coefficient and autocorrelation function excess) and fractal (dispersion of logarithmic dependencies of power spectra) parameters are presented [1]. They characterize the distributions of Mueller matrix elements in the points of laser images of myometrium histological sections. The criteria of differentiation of death coming reasons are determined [2].

The results of experimental investigations of coordinate $Z_{44}(m \times n)$ − fragments (a), (b); statistical $h(Z_{44})$, − fragments (c), (d); correlation $K(Z_{44})$, − fragments (e), (f) and fractal $\log J(Z_{44}) - \log d^{-1}$, − fragments (g), (h) structure of Mueller matrix phase elements $Z_{44}$ of myometrium of the heaths patients − group 1 (left column) and sick patients  - group 2 are illustrated by Fig. 1 and Table 1.
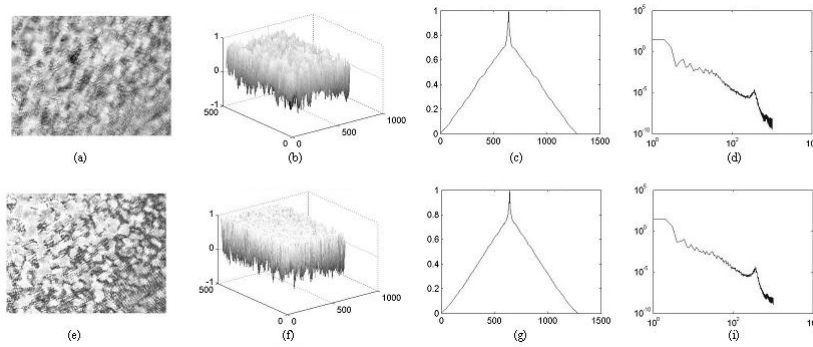


**Figure 1.** Statistical, correlation and fractal parameters of myometrium phase element $Z_{44}$ distributions

**Table 1.** Statistical moments $M_{j=1;2;3;4}(Z_{44})$ of coordinate distributions $Z_{44}(m \times n)$ of myometrium tissue for group 1 and group 2 cases

| Parameters | Group 1 | Group 2 |
|---|---|---|
| $S(Z_{44})$ | $0,21 \pm 0,026$ | $0,26 \pm 0,037$ |
| $Q_2(Z_{44})$ | $0,35 \pm 0,044$ | $0,31 \pm 0,039$ |
| $Q_4(Z_{44})$ | $0,43 \pm 0,051$ | $0,53 \pm 0,062$ |
| $M_1(Z_{44})$ | $0,21 \pm 0,026$ | $0,26 \pm 0,037$ |
| $M_2(Z_{44})$ | $0,35 \pm 0,044$ | $0,31 \pm 0,039$ |
| $M_3(Z_{44})$ | $0,43 \pm 0,051$ | $0,53 \pm 0,062$ |
| $M_4(Z_{44})$ | $1,16 \pm 0,14$ | $1,37 \pm 0,16$ |

The efficiency of the method of azimuthally invariant Mueller-matrix mapping of laser polarization polarimetry of biological tissues in the task of differentiation was demonstrated.

[1]. Yu.A. Ushenko, O.V. Dubolazov, and A.O. Karachevtsev, Optical Memory and Neural Networks (Information Optics), 20(2), 145–154 (2011).
[2]. Yuriy A. Ushenko, J. Biomed. Opt. 16(6), 066006  (2011).