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Микроинтервали у спектралној геометрији

Microintervals in Spectral Geometry

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The process of projecting spectrum harmonics aiming at establishing the tone fundus which would be based on micro intervals has been described in this monograph – that is, tone relations known in late ancient and the Middle East music theory, as well as in theory and practice of the Balkan provenance. The process of projection reveals the real nature of ancient Greek mode, the nature of ancient diatonic, chromatic and enharmonic mode. The author harbors a special affinity towards ancient, as well as towards the renaissance theory of proportions. Therefore, in this study, the author has presented the new theory of *Tonsatz* based on the process of projecting the relation of harmonics in the spectrum, as well as on the establishment of order in the system of proportions.

The projection of aliquot data is realized by the use of projectors. The projector is a virtual (non-material) means which follow a comprehending, proportional row in the scope of the system of one or more aliquots, and has no intentions to disturb the row. Projection of intervals or chords is the process during which the same elementary structure is kept, but its function is changed. Vertical position of two different tonal pitches (harmonic interval), that is, the position of three or more different pitches (harmonic chord) is laid with the projection process into the horizontal position of two different tone longitudes (projected interval), that is, the horizontal position of three or more different longitudes (projected chord).

In the vertical progression, octave cuts the spectrum on duple harmonics and therefore, relative pitches (pitches of higher aliquot towards lower), which cannot achieve half the value of fundamental, will always be on the so-called left side of the spectrum (*5:4; 5:3*), starting from the third aliquot. Those relative pitches, which will surpass the half of the fundamental value, will appear with the absolute pitch (the pitch of one aliquot towards fundamental) of each separate aliquot on the right side of the spectrum (*5:2; 5:1*).

For the above-mentioned intervals, besides the landmark left-right, the landmarks upper-under are used because the so-called summation tones (sub-aliquots) appear repeatedly, although only through proportions, besides partial tones of aliquot series which have been mentioned so far. Derivative of summation tones is carried out with the old Pythagorean procedure, known under the name *lambdoma* in which denominator and numerator of a fraction, which make the value of the given harmonic in the perceptible part of the spectrum, change places, or more precisely, produce the other, inversely proportional value of the same elementary structure.

When the projector "lightens" the given harmonic interval newly-formed projected picture will be followed by a *shadow*. This brings with itself two important data: resolution of the given aliquot relation and the length of its stretching.

The fundamental is defined as a referent body while the aliquot with fundamental as the reference system.

With the use of a projector, two areas of shadow – *umbra* and *penumbra* – appeared on the surface of the lightened aliquot relation (2:1; 3:2; 3:1 and so on). The first area, *umbra*, points to the number of tiny parts – or units – of the newly gained projected photo, whereas the other, *penumbra*, points to the projected flat surface of the given upright object under a certain angle.

Antumbra is, in the projected picture of the separate aliquot relation, unused shaded region and makes the partial rest, which is from the perspective of the upper spectrum – visibly left out (these remains divide the right boundary of *umbra* from the right boundary of *penumbra* and they are not bound by a tie), whereas from the perspective of under spectrum – invisibly present (inside *penumbra* it is not possible to isolate partial remainder which makes *antumbra* because it is bound by a tie).

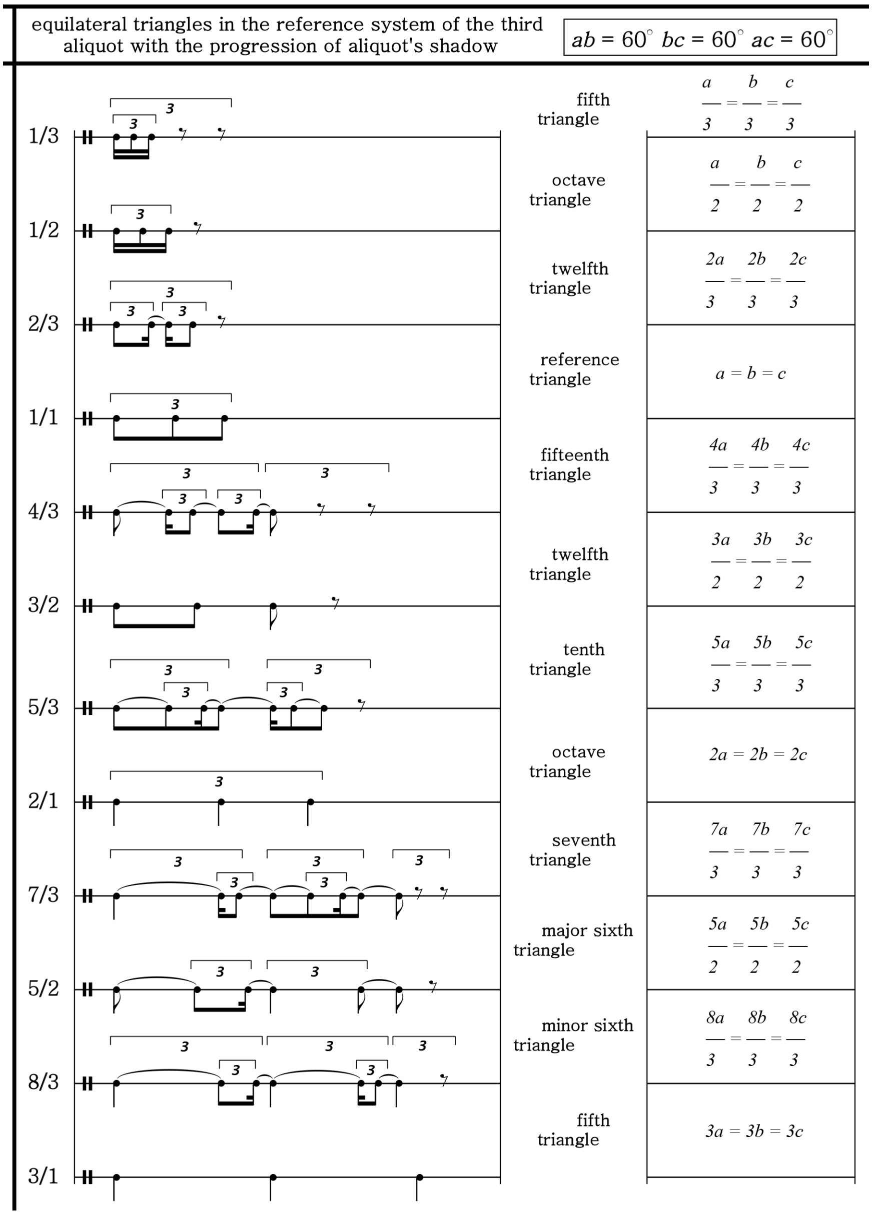
Let us look back at the process itself of measuring and counting interval angles in order to note the clear distinction between angle velocity of the interval and angle acceleration of the interval in the given reference system.

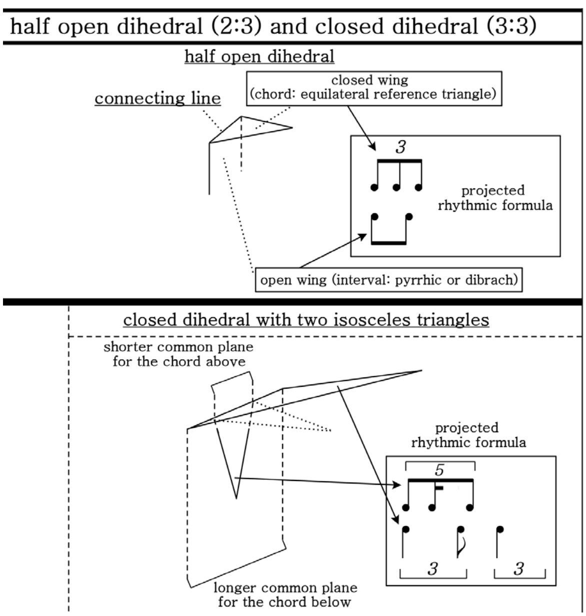
During the motion of the material dot along the circumference in the reference system of the given aliquot, its radius-vector described the following angles and made certain angle changes $\Delta\theta$: (1) $\pi/2$ rad. 90˚ convex (right) angle, that is, the projected angle of the rhythmical eighth opposite the rhythmical eighth; (2) π rad. 180˚ stretched out the angle, that is, the line segment of the fundamental; (3) $3\pi/2$ rad. 270˚ concave (right) angle, that is, projected angle of the rhythmical half (rhythmical fourth in relation to rhythmical fourth).

Convex angles of umbra are proportionate to the concave angles of the penumbra of the higher interval in the projection, and both types of angles belong to the one and only aliquot referent system.

Newly stretched out leg of the rhythmical half is on the vertical line under the stretched out leg of the rhythmical eighth because partial octave tone from the fundamental stands above the summation octave tone to the fundamental. In the same way, as Lorenzo's transformations give the bond of the coordinates of one event from two systems of reference, which is in accordance with the theory of relativity and similarly, they are valid only in the case when the systems are moving without acceleration, we come to the conclusion that it will be necessary to establish bonds of coordinates of one more (external) system for the reference system of the second and any other following aliquot, where Δt time interval is measured in the inertial system, whereas Δt_o time interval between two events is measured in some other inertial system, in which events happened in the same place. Material dot, in the reference system of the second aliquot, passes the way along the circle path which in angles amounts to $3\pi/2$ radians and it would be logical that its mensural value amounts to the rhythmical dotted fourth (3/2), but it is not the case because in the higher reference system we realize that the octave (2/1), which happened on the same coordinate axis ($3\pi/2$), submitted inversion in the same way as it had changed position in the system of the second aliquot.

Relations, which were valid for interval constellations of the interval fund of the third aliquot, and these are 1/3 + 2/3 and 2/3 + 1/3 and with their superposition could establish a unique relation: 1/3 + 1/3 + 1/3. With this approach, not only that the first projected accord was formed, but two new angle regions were realized by the *antumbra* fragmentation. With the superposition, we recognized that legs of a





triangle, which formed the angle of a fifth, were then joined with the new leg, which will connect two non-collinear dots, and the angle size for the newly formed angle is equal to the size of the first, as well as for the size of the second. We state that the projected accord makes the triangle on the flat surface which is in the reference system of the third aliquot – equilateral triangle (all angles are the same) – 60˚ + 60˚ + 60.˚

The sum of umbra octave would be 1/2 + 1/2 + 1/2 and equally, it would present the equilateral triangle – the triangle which would belong to the shaded region of the summation (metrical) twelfth (3/2) whereas the sum of fundamental, extracted from the summation of umbra fifth and octave would amount to: 1/1 + 1/1 + 1/1, and equally, it would present the equilateral triangle – the triangle which would belong to the shaded region of the summation (metrical) fifth (3/1).

In the reference system of the fourth aliquot, three different referent triangles will appear. These referent triangles are opposite to the referent triangle of the third aliquot – the triplet chord – isosceles.

Two or more superponated aliquot-geometrical figures on the even surface form the aliquot-geometrical body in space. General classification of the aliquot-geometrical bodies would be based on the open forms – so called *aliquot dihedrals*; and on closed forms, the above mentioned – *aliquot polyhedron*. Firstly, we define three basic types of dihedrals:

(1) open dihedral with the structure 2:2 is the dihedral made by superposition of two projected intervals on the same or different metrical line segment: for example, two pyrrhics; or pyrrhic and iambus; (2) half open dihedral with the structure (2a) 2:3 is the dihedral made by superposition of the projected interval and the projected chord - triangle, while (2b) half open dihedral with the structure 2:4 is the dihedral made by the superposition of the projected interval and the projected chord - quadrangle; and (3) closed dihedral with the structure (3a) 3:3 is the dihedral made by the superposition of two projected chords, and closed dihedral with the structure (3b) 3:4 is the dihedral made by the superposition of two projected chords - triangle and quadrangle, on the same or different metrical line segment.

It is interesting that from the musical-geometrical perspective, elementary polyrhythmic relations (3:2) and (4:3) are different: the first relation is made by a half open dihedral, while the second is made by closed dihedral. The poly-projected relation has to be followed by poly-intonation relation.

The main idea of the author was to point to and reveal the moment of force which has not been defined and located yet, with which a bi-centric nature of musical being would be moved. It denotes renaming and changing the meaning of the function of a given harmonic-melodic phenomenon to the rhythmical and melodic phenomenon.

У овој монографији описан је поступак пројекције хармоника спектра у циљу успостављања тонског фундуса који би био заснован на микроинтервалима – тонским односима познатим у позноантичкој и блискоисточној музичкој теорији, као и у теорији и пракси балканске провенијенције.

Основна идеја аутора монографије била је да се укаже и разоткрије још увек неодређен и нелоциран момент силе којим би се покренула бицентрична природа музичког бића. Реч је о преименовању и презначењу функције једног хармонско-мелодијског феномена на ритмички и метрички феномен, што представља предмет ове монографије. Циљ монографије је да упути читаоца на траг који за собом оставља једна те иста елементарна структура – на траг једног те истог бића које, уосталом, препознаје и Дионисиос из Халикарнаса.

Аутор гаји и посебан афинитет према античкој и ренесансној теорији пропорција и стога у овом раду износи нову теорију тонског слога засновану на поступку пројекције односа хармоника у спектру, као и на успостављању реда у систему пропорција.