06 Discrete Mathematic

Petrenjuk V. I.
pz@kdtu.kr.ua

Some applications of φ-transformations method .

Task: The investigation of structural properties of simple connected planar graphs with given reachability number of some set of points of graph; decomposition graphs with fixed Euler genus into some subgraphs with small genus.

Method: φ-transformations of graphs as topological spaces of $2-$manifolds by Khomenko N.P.φ-transformations graphs. Institute of Mathematic, Kiev, 1973.

Results: I. For φ-transformation defined on planar graphs G_1 and G_2, where G_2 is a star $St_n(g_0)$, by means following: $\varphi(G_1 + G_2, \sum_{i=1}^{n} a_i + g_i) \to (\Im, \{a_i^*\}_1^n)$, where $M_1 = \{a_i\}_1^n, t_{G_1}(M_1) = t, \cdot t > 1, M_2 = \{g_i\}_1^n, t_{G_2}(M_2) = 1\cdot$ are points sets of G_1 and G_2 with reachability numbers $t, 1$,was recieved follow:

1. The structure of planar and toroidal graphs with fixed reachability number of given points set was investegated, point is vertex or interior point of edge.

2. The structure of t-minimal graph whose set of vertex h has reachability number equal t, $t > 1$, and this number will be decreased after deletion or contruction any edge was investegated. A list of 3-minimal planar graphs was found.

3. The upper boundary of the genus $\gamma(\Im)$ was recieved. If $\Im$ is a φ-image of planar graph G and star $St_n(g_0)$ by means φ-transformation defined as shown above, then $\gamma(\Im) \leq \gamma(G) + t - \theta - \partial\theta - 1$,where $M = \{a_i^*\}_1^n, \cdot t_G(M) = t$, $\theta_G(M) = \theta, \cdot \partial\theta_G(M) = \partial\theta, \cdot t > 1, \cdot \theta \geq 0, \cdot \partial\theta \geq 0$.

4. New characteristics $\partial\theta, \theta$ of the points set M of the graph $G$and dual graph Ω was introduced, they are discribed a cyclical and a paths structure of this graph Ω.

II. A results for φ-transformations of planar graphs G_1, G_2 defined as shown above on sets M_1, M_3 with reachability numbers more then 1 was recieved ricently.

Subject: 05C10, 05C85

Key: φ-transformations of pianar graphs, genus, reachability number