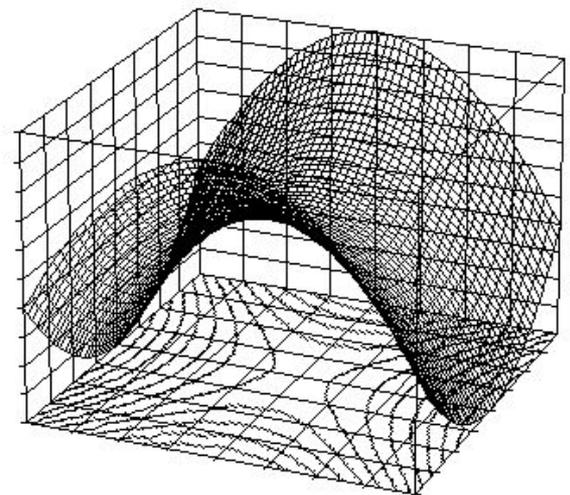
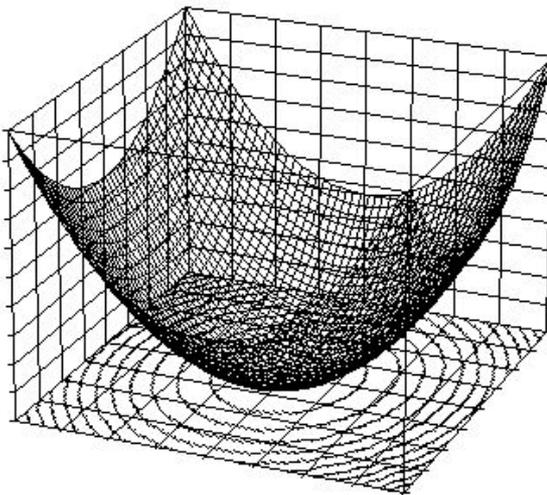
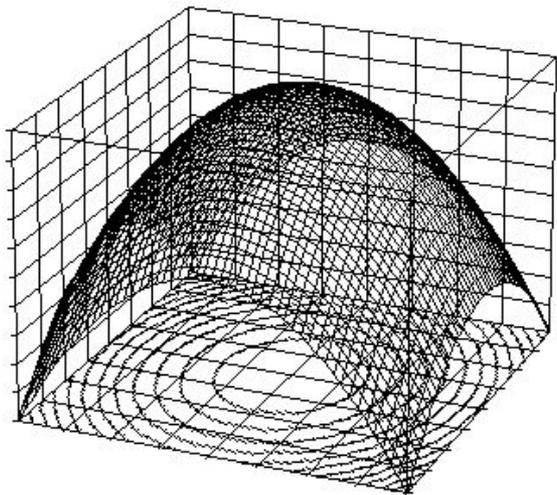
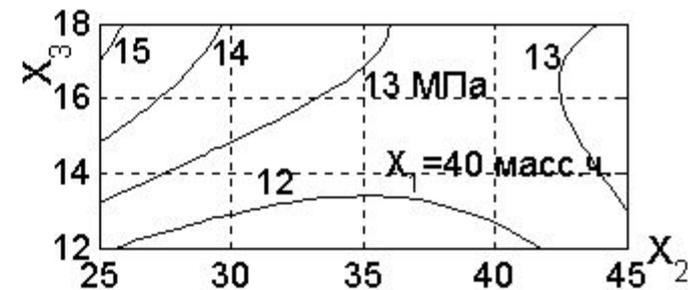
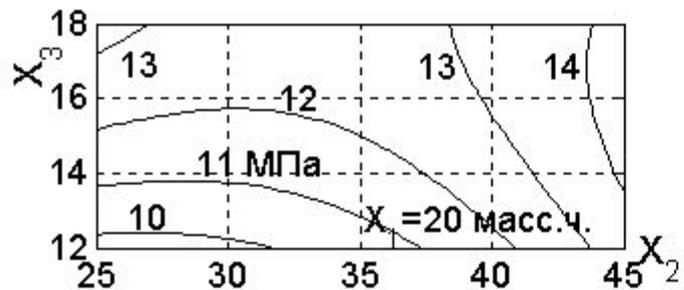
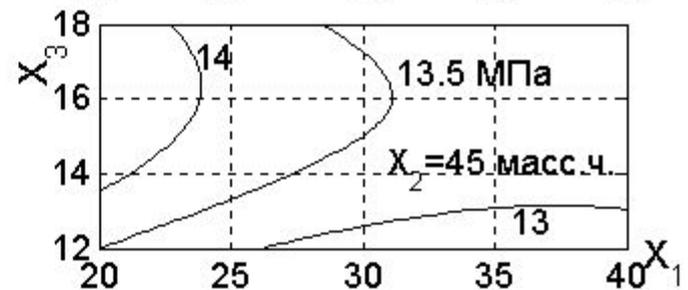
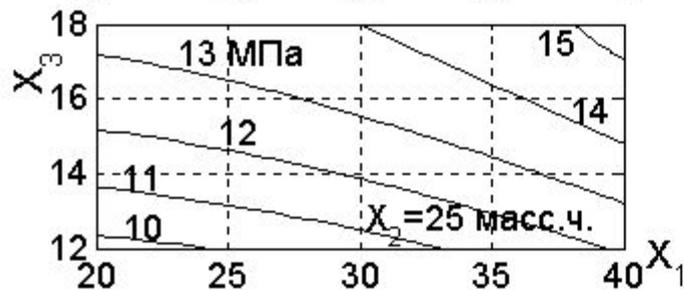
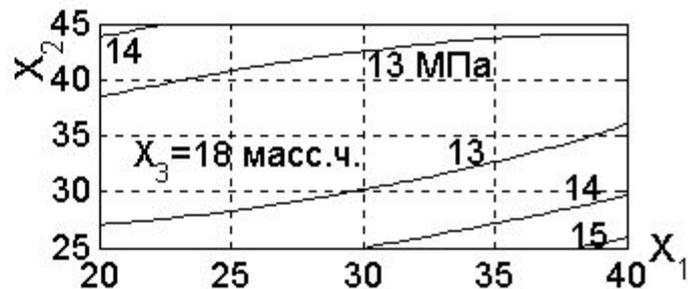
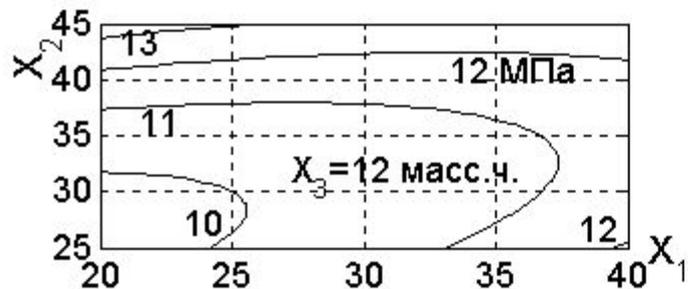


ПРИНЦИПЫ МАТЕМАТИЧЕСКОЙ ХИМИИ

ТОПОЛОГИЯ И ТЕОРИЯ ГРАФОВ
ГРАФЫ ОРИЕНТИРОВАННЫЕ И
НЕОРИЕНТИРОВАННЫЕ,
ВЕРШИНЫ, РЕБРА, ДУГИ
ПОВЕРХНОСТИ ВТОРОГО ПОРЯДКА



Изолинии прочности резин для клиновых ремней вдоль направления каландрования



$$Z_1 + Z_2 + 2Z_3 = 2 + C_2 + 2C_3$$

$$Z_1 + 2Z_2 + 4Z_3 = C_1 + 2C_2 + 4C_3$$

Система ограничений:

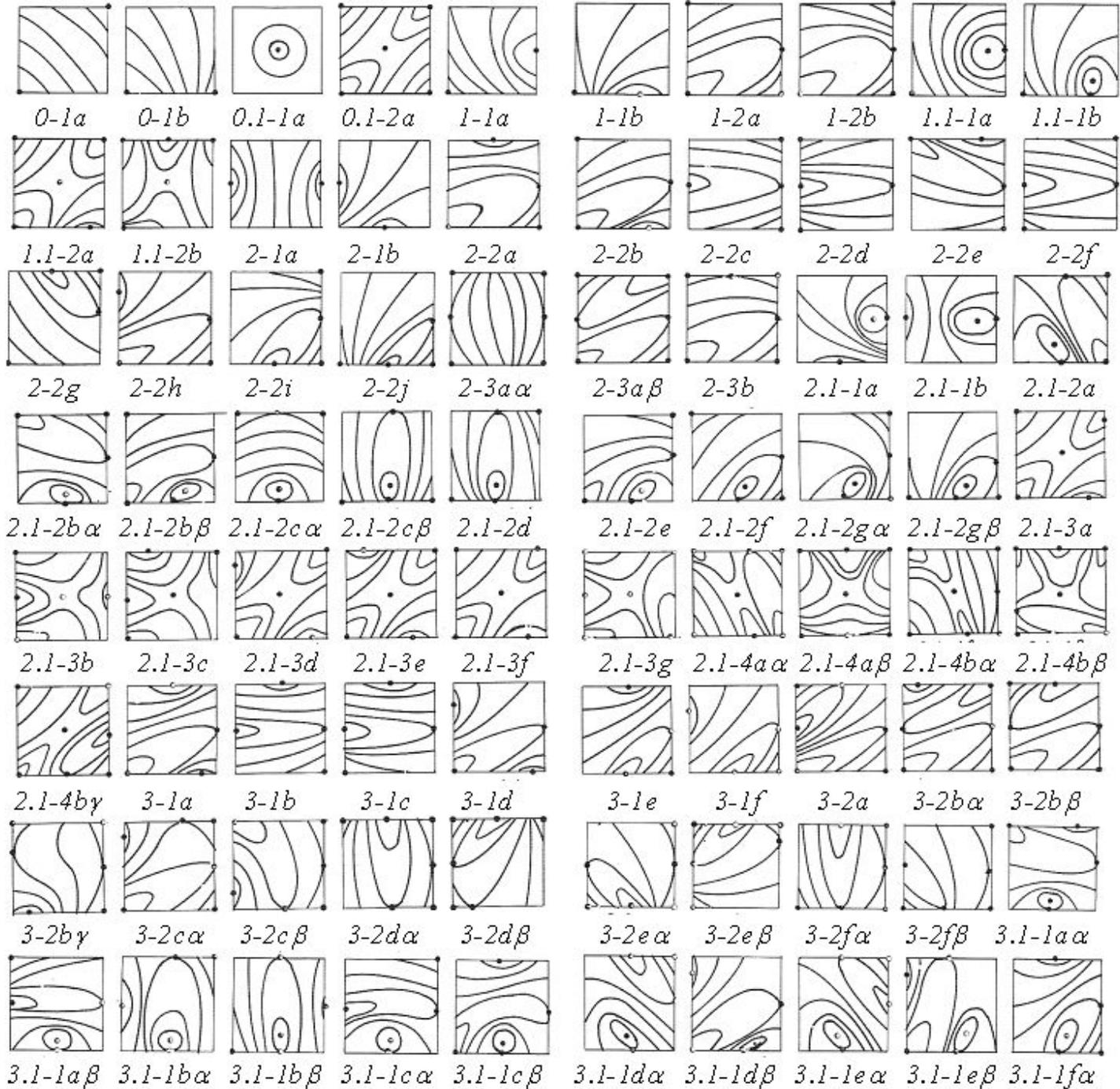
$$\begin{aligned} Z_1 &= 0,1,2,3 \text{ или } 4; & Z_2 &= 0,1,2,3 \text{ или } 4; & Z_3 &= 0 \text{ или } 1; \\ C_1 &= 0,1,2,3 \text{ или } 4; & C_2 &= 0,1,2,3 \text{ или } 4; & C_3 &= 0 \text{ или } 1; \\ Z_1 + C_1 &= 4; & Z_2 + C_2 &= 0,1,2,3 \text{ или } 4; & Z_3 + C_3 &= 0 \text{ или } 1. \end{aligned}$$

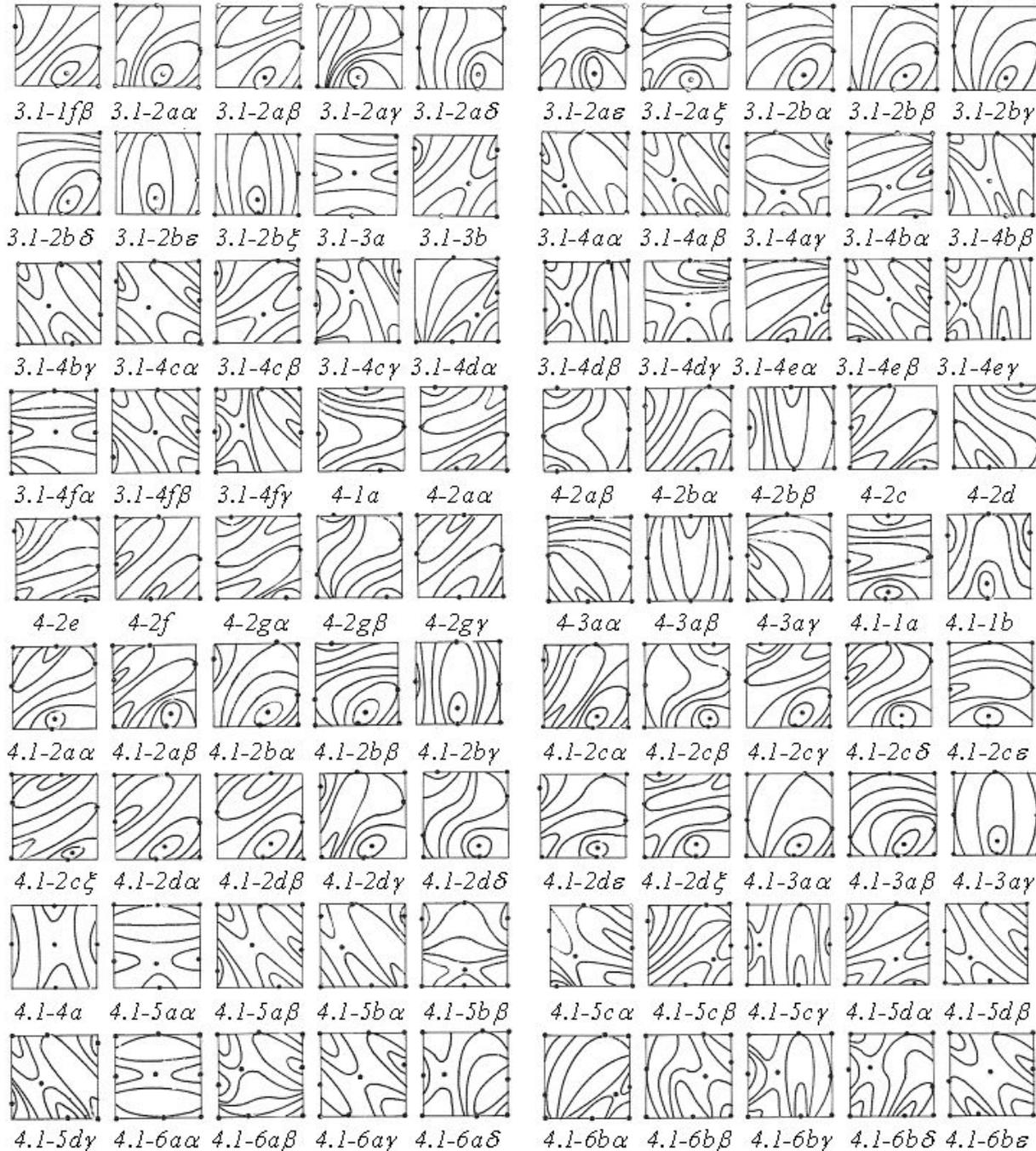
$$\begin{pmatrix} \varphi_{11} & \varphi_{12} & \varphi_{13} \\ \varphi_{21} & \varphi_{22} & \varphi_{23} \\ \varphi_{31} & \varphi_{32} & \varphi_{33} \end{pmatrix}$$

Классы и типы геометрических образов

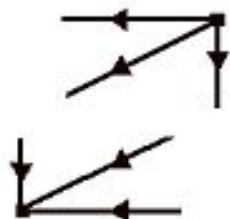
Распределение особых точек

| Класс | Тип | Распределение особых точек | | | | | |
|-------|-----|----------------------------|-------|-------|-------|-------|-------|
| | | Z_1 | C_1 | Z_2 | C_2 | Z_3 | C_3 |
| 0 | 1 | 2 | 2 | 0 | 0 | 0 | 0 |
| 0.1 | 1 | 0 | 4 | 0 | 0 | 1 | 0 |
| | 2 | 4 | 0 | 0 | 0 | 0 | 1 |
| 1 | 1 | 1 | 3 | 1 | 0 | 0 | 0 |
| | 2 | 3 | 1 | 0 | 1 | 0 | 0 |
| 1.1 | 1 | 1 | 3 | 0 | 1 | 1 | 0 |
| | 2 | 3 | 1 | 1 | 0 | 0 | 1 |
| 2 | 1 | 0 | 4 | 2 | 0 | 0 | 0 |
| | 2 | 2 | 2 | 1 | 1 | 0 | 0 |
| | 3 | 4 | 0 | 0 | 2 | 0 | 0 |
| 2.1 | 1 | 0 | 4 | 1 | 1 | 1 | 0 |
| | 2 | 2 | 2 | 0 | 2 | 1 | 0 |
| | 3 | 2 | 2 | 2 | 0 | 0 | 1 |
| 3 | 4 | 4 | 0 | 1 | 1 | 0 | 1 |
| | 1 | 1 | 3 | 2 | 1 | 0 | 0 |
| | 2 | 3 | 1 | 1 | 2 | 0 | 0 |
| 3.1 | 1 | 1 | 3 | 1 | 2 | 1 | 0 |
| | 2 | 3 | 1 | 0 | 3 | 1 | 0 |
| | 3 | 1 | 3 | 3 | 0 | 0 | 1 |
| | 4 | 3 | 1 | 2 | 1 | 0 | 1 |
| 4 | 1 | 0 | 4 | 3 | 1 | 0 | 0 |
| | 2 | 2 | 2 | 2 | 2 | 0 | 0 |
| | 3 | 4 | 0 | 1 | 3 | 0 | 0 |
| 4.1 | 1 | 0 | 4 | 2 | 2 | 1 | 0 |
| | 2 | 2 | 2 | 1 | 3 | 1 | 0 |
| | 3 | 4 | 0 | 0 | 4 | 1 | 0 |
| | 4 | 0 | 4 | 4 | 0 | 0 | 1 |
| | 5 | 2 | 2 | 3 | 1 | 0 | 1 |
| | 6 | 4 | 0 | 2 | 2 | 0 | 1 |

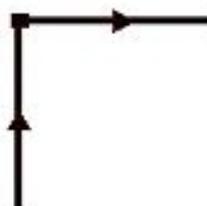




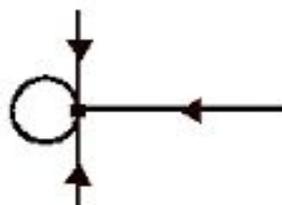
Качественное изображение изолиний (виды контурных графиков)



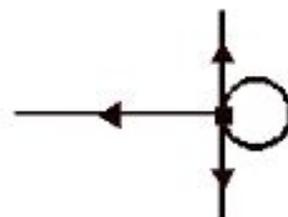
Вершина типа Z_1



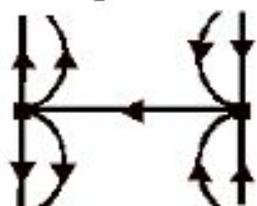
Вершина типа C_1



Вершина типа Z_2



Вершина типа C_3



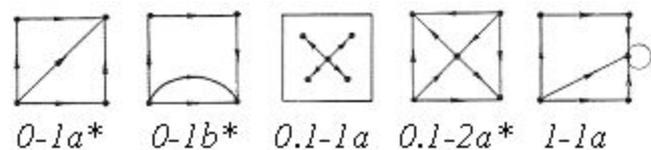
Вершина типа C_2



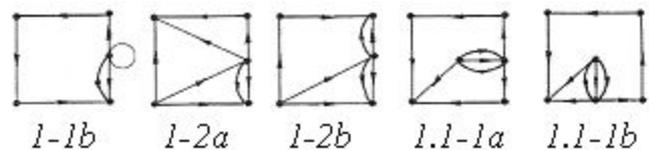
Вершина типа Z_3



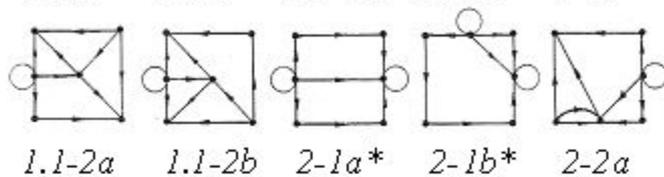
Ассортимент вершин графа



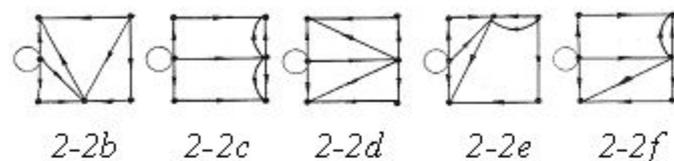
0-1a* 0-1b* 0.1-1a 0.1-2a* 1-1a



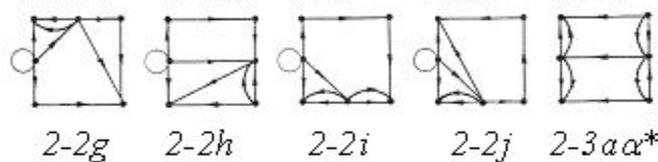
1-1b 1-2a 1-2b 1.1-1a 1.1-1b



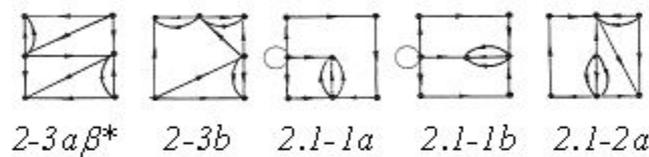
1.1-2a 1.1-2b 2-1a* 2-1b* 2-2a



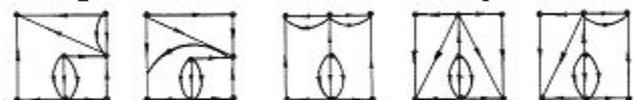
2-2b 2-2c 2-2d 2-2e 2-2f



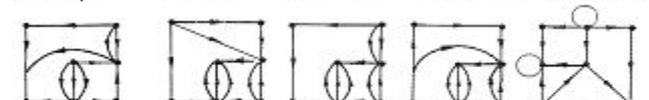
2-2g 2-2h 2-2i 2-2j 2-3aα*



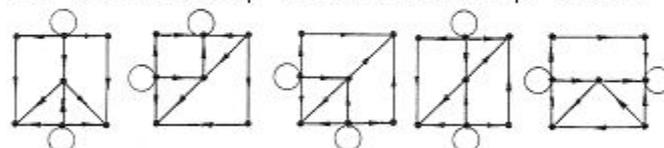
2-3aβ* 2-3b 2.1-1a 2.1-1b 2.1-2a



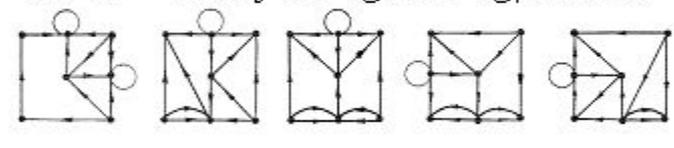
2.1-2bα 2.1-2bβ 2.1-2cα 2.1-2cβ 2.1-2d



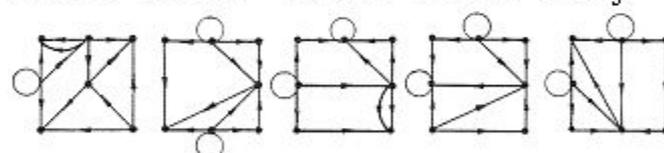
2.1-2e 2.1-2f 2.1-2gα 2.1-2gβ 2.1-3a



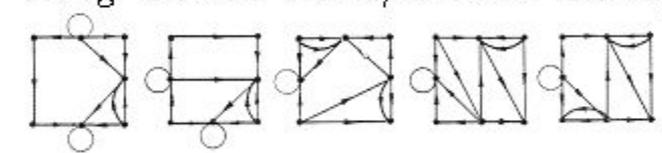
2.1-3b 2.1-3c* 2.1-3d 2.1-3e 2.1-3f*



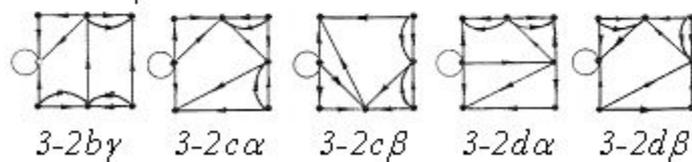
2.1-3g 2.1-4aα 2.1-4aβ 2.1-4bα 2.1-4bβ



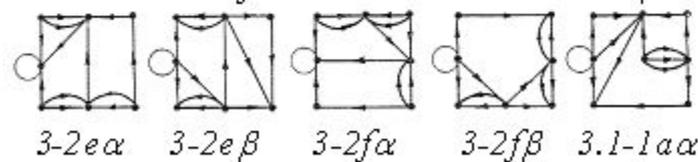
2.1-4bγ 3-1a 3-1b 3-1c 3-1d



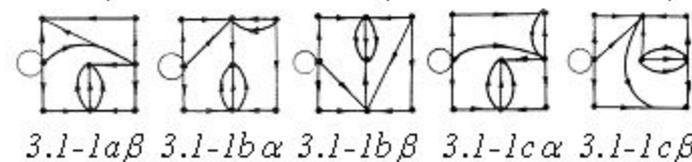
3-1e 3-1f 3-2a 3-2bα 3-2bβ



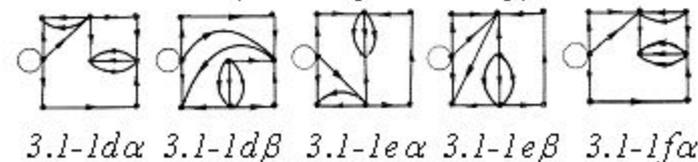
3-2bγ 3-2cα 3-2cβ 3-2dα 3-2dβ



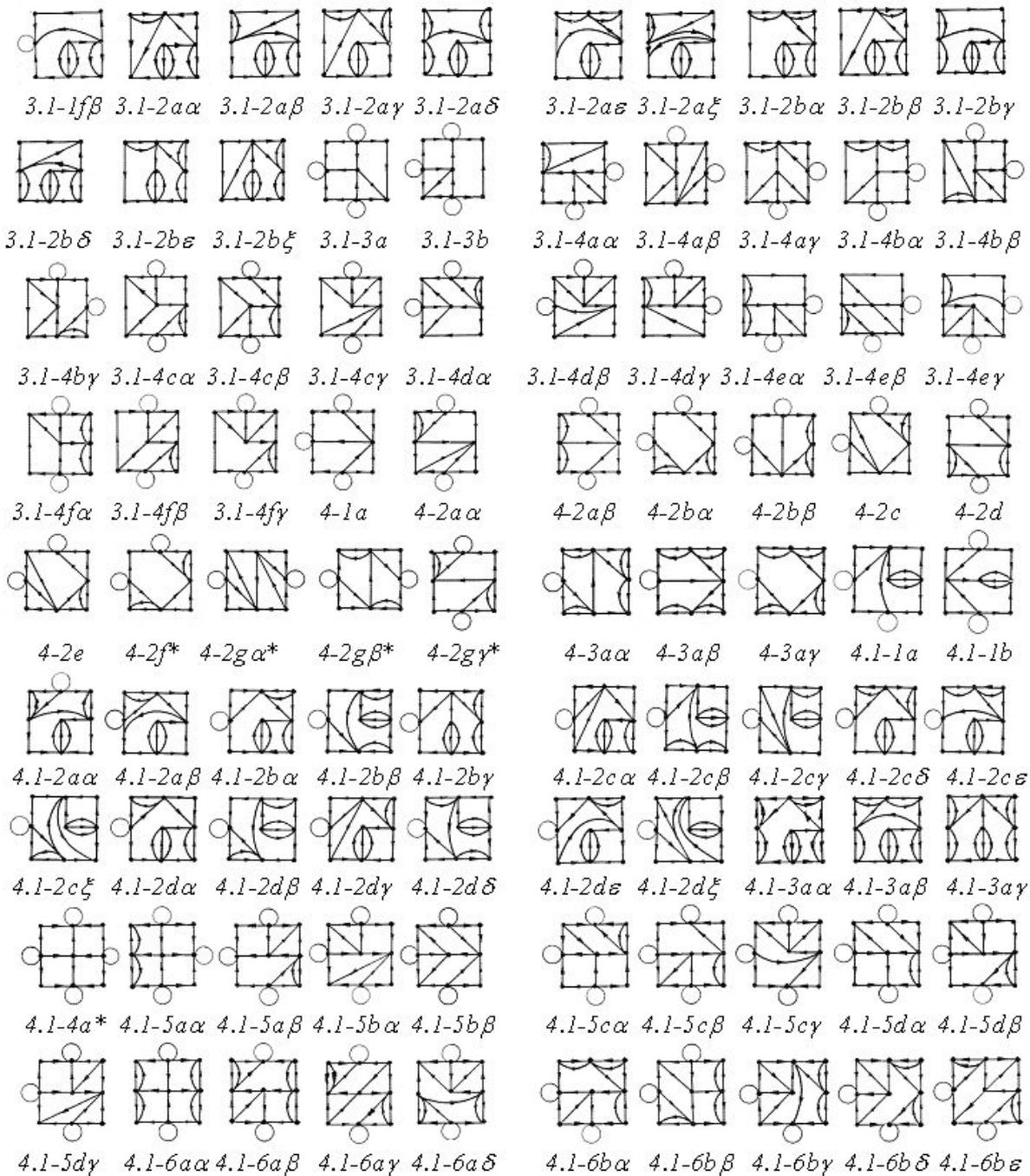
3-2eα 3-2eβ 3-2fα 3-2fβ 3.1-1aα



3.1-1aβ 3.1-1bα 3.1-1bβ 3.1-1cα 3.1-1cβ



3.1-1dα 3.1-1dβ 3.1-1eα 3.1-1eβ 3.1-1fα



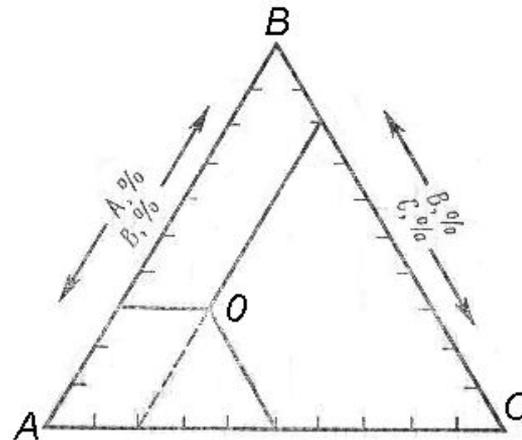
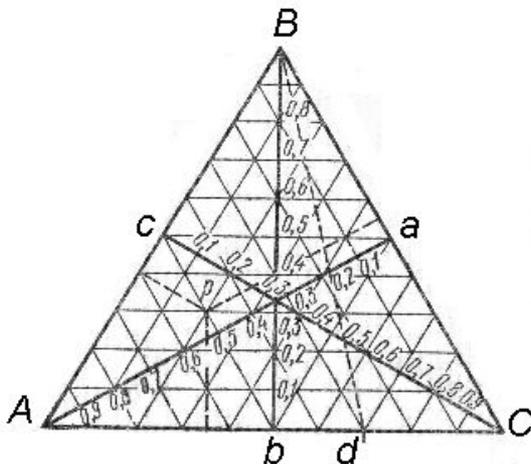
Представление контурных графиков в виде графов

СИМПЛЕКС, ОСОБЫЕ ТОЧКИ

$$Z_1 + 3Z_2 + 6Z_3 = 2C_1 + 3C_2 + 6C_3$$

ОГРАНИЧЕНИЯ

- $Z_1=0, 1, 2$ или 3 $Z_2=0, 1, 2$ или 3 $Z_3=0$ или 1
- $C_1=0, 1, 2$ или 3 $C_2=0, 1, 2$ или 3 $C_3=0$ или 1
- $Z_1 + C_1 = 3$ $Z_2 + C_2 = 0, 1, 2$ или 3 $Z_3 + C_3 = 0$ или 1
- 8 классов и 17 типов диаграмм



Классы и типы диаграмм состав-свойство

| Класс | Тип | z_1 | c_1 | z_2 | c_2 | z_3 | c_3 |
|-------|-----|-------|-------|-------|-------|-------|-------|
| 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 |
| 0.1 | 1 | 0 | 3 | 0 | 0 | 1 | 0 |
| 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 |
| | 2 | 3 | 0 | 0 | 1 | 0 | 0 |
| 1.1 | 1 | 1 | 2 | 0 | 1 | 1 | 0 |
| | 2 | 3 | 0 | 1 | 0 | 0 | 1 |
| 2 | 1 | 0 | 3 | 2 | 0 | 0 | 0 |
| | 2 | 2 | 1 | 1 | 1 | 0 | 0 |
| 2.1 | 1 | 0 | 3 | 1 | 1 | 1 | 0 |
| | 2 | 2 | 1 | 0 | 2 | 1 | 0 |
| | 3 | 2 | 1 | 2 | 0 | 0 | 1 |
| 3 | 1 | 1 | 2 | 2 | 1 | 0 | 0 |
| | 2 | 3 | 0 | 1 | 2 | 0 | 0 |
| 3.1 | 1 | 1 | 2 | 1 | 2 | 1 | 0 |
| | 2 | 3 | 0 | 0 | 3 | 1 | 0 |
| | 3 | 1 | 2 | 3 | 0 | 0 | 1 |
| | 4 | 3 | 0 | 2 | 1 | 0 | 1 |

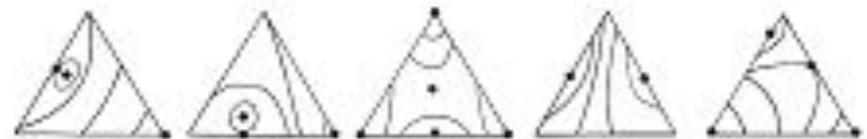
Подтипы диаграмм

| | | | | |
|---|---|---|---|---|
| $\begin{pmatrix} 1 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ <i>0-1a</i> | $\begin{pmatrix} 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{pmatrix}$ <i>0.1-1a</i> | $\begin{pmatrix} 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ <i>1-1a</i> | $\begin{pmatrix} 0 \\ 0 & 0 & 0 \\ 0 & 1 & 1 \end{pmatrix}$ <i>1-1b</i> | $\begin{pmatrix} 1 \\ 2 & 0 & 0 \\ 1 & 0 & 1 \end{pmatrix}$ <i>1-2a</i> |
| $\begin{pmatrix} 0 \\ 2 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ <i>1.1-1a</i> | $\begin{pmatrix} 0 \\ 0 & 1 & 0 \\ 0 & 2 & 1 \end{pmatrix}$ <i>1.1-1b</i> | $\begin{pmatrix} 1 \\ 0 & 2 & 0 \\ 1 & 1 & 1 \end{pmatrix}$ <i>1.1-2a</i> | $\begin{pmatrix} 0 \\ 1 & 0 & 1 \\ 0 & 0 & 0 \end{pmatrix}$ <i>2-1a</i> | $\begin{pmatrix} 0 \\ 1 & 0 & 2 \\ 1 & 0 & 1 \end{pmatrix}$ <i>2-2a</i> |
| $\begin{pmatrix} 0 \\ 1 & 0 & 0 \\ 1 & 2 & 1 \end{pmatrix}$ <i>2-2b</i> | $\begin{pmatrix} 0 \\ 0 & 0 & 2 \\ 1 & 1 & 1 \end{pmatrix}$ <i>2-2c</i> | $\begin{pmatrix} 0 \\ 2 & 1 & 1 \\ 0 & 0 & 0 \end{pmatrix}$ <i>2.1-1a</i> | $\begin{pmatrix} 0 \\ 2 & 1 & 2 \\ 1 & 0 & 1 \end{pmatrix}$ <i>2.1-2a</i> | $\begin{pmatrix} 1 \\ 2 & 1 & 2 \\ 0 & 0 & 1 \end{pmatrix}$ <i>2.1-2b</i> |
| $\begin{pmatrix} 0 \\ 1 & 2 & 1 \\ 1 & 0 & 1 \end{pmatrix}$ <i>2.1-3a</i> | $\begin{pmatrix} 1 \\ 1 & 2 & 1 \\ 1 & 0 & 0 \end{pmatrix}$ <i>2.1-3b</i> | $\begin{pmatrix} 1 \\ 1 & 0 & 1 \\ 0 & 2 & 0 \end{pmatrix}$ <i>3-1a</i> | $\begin{pmatrix} 1 \\ 1 & 0 & 2 \\ 0 & 1 & 0 \end{pmatrix}$ <i>3-1b</i> | $\begin{pmatrix} 1 \\ 1 & 0 & 2 \\ 1 & 2 & 1 \end{pmatrix}$ <i>3-2a</i> |
| $\begin{pmatrix} 1 \\ 2 & 1 & 2 \\ 0 & 1 & 0 \end{pmatrix}$ <i>3.1-1a</i> | $\begin{pmatrix} 1 \\ 2 & 1 & 1 \\ 0 & 2 & 0 \end{pmatrix}$ <i>3.1-1b</i> | $\begin{pmatrix} 1 \\ 2 & 1 & 2 \\ 1 & 2 & 1 \end{pmatrix}$ <i>3.1-2a</i> | $\begin{pmatrix} 1 \\ 1 & 2 & 1 \\ 0 & 1 & 0 \end{pmatrix}$ <i>3.1-3a</i> | $\begin{pmatrix} 1 \\ 1 & 2 & 1 \\ 1 & 2 & 1 \end{pmatrix}$ <i>3.1-4a</i> |

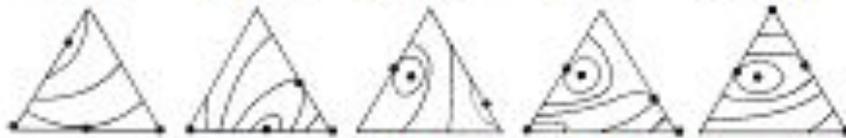
Качественное изображение изолиний (виды диаграмм состав-свойство)



0-1a 0.1-1a 1-1a 1-1b 1-2a



1.1-1a 1.1-1b 1.1-2a 2-1a 2-2a



2-2b 2-2c 2.1-1a 2.1-2a 2.1-2bα



2.1-2bβ 2.1-3a 2.1-3b 3-1a 3-1b

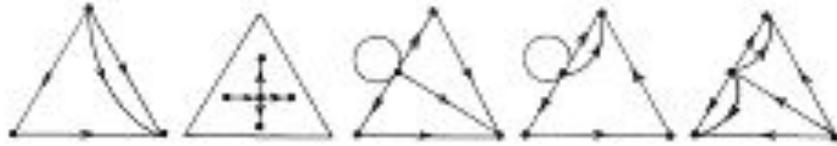


3-2a 3.1-1a 3.1-1bα 3.1-1bβ

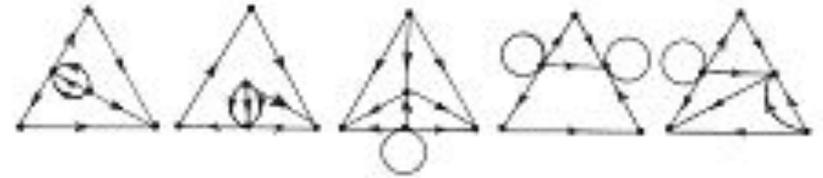


3.1-2a 3.1-3a 3.1-4aα 3.1-4aβ

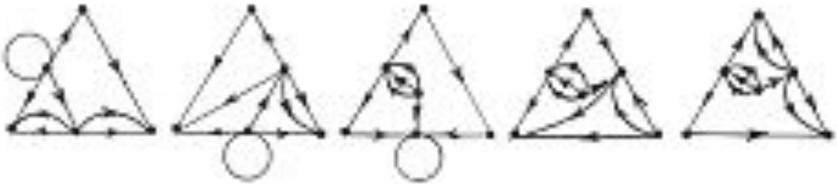
Представление диаграмм на симплексе в форме графов



0-1a 0.1-1a 1-1a 1-1b 1-2a



1.1-1a 1.1-1b 1.1-2a 2-1a 2-2a



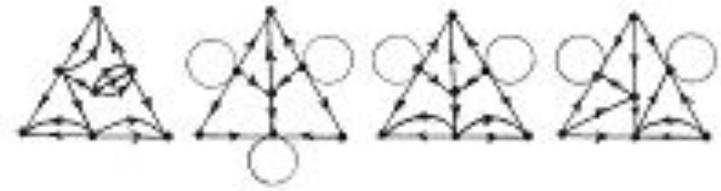
2-2b 2-2c 2.1-1a 2.1-2a 2.1-2b α



2.1-2b β 2.1-3a 2.1-3b 3-1a 3-1b

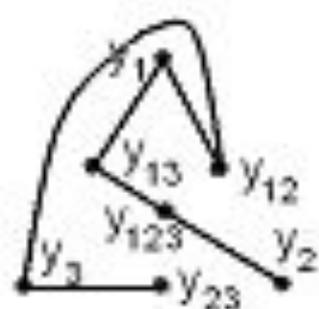
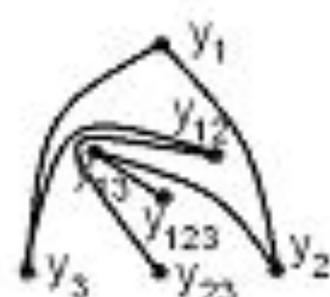
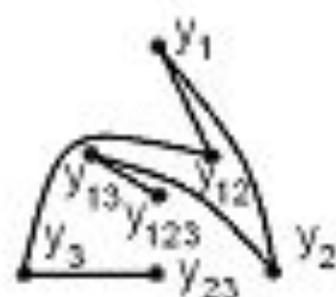
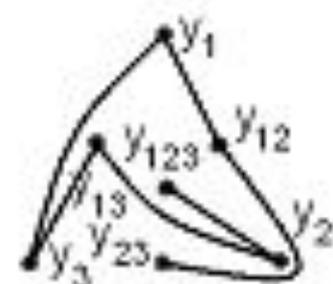
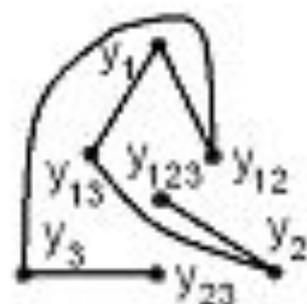


3-2a 3.1-1a 3.1-1b α 3.1-1b β



3.1-2a 3.1-3a 3.1-4a α 3.1-4a β

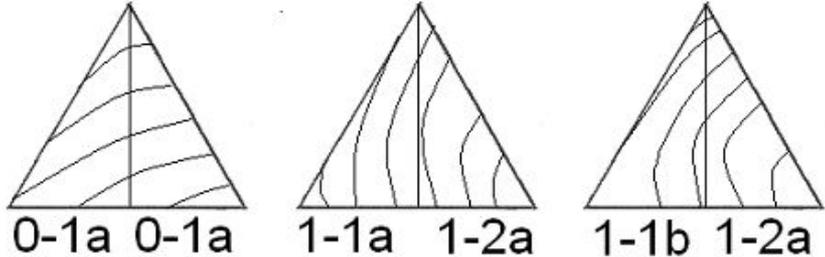
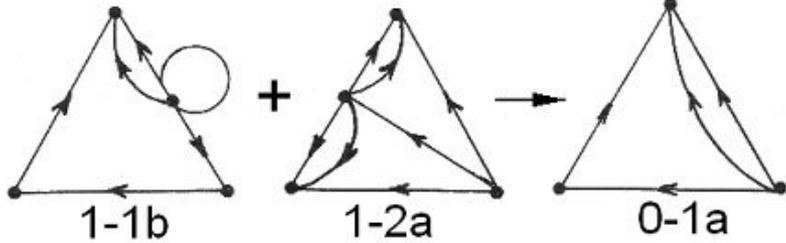
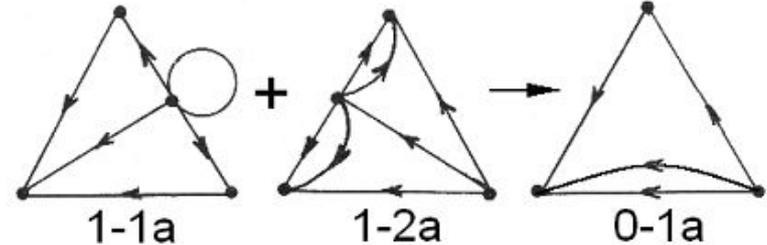
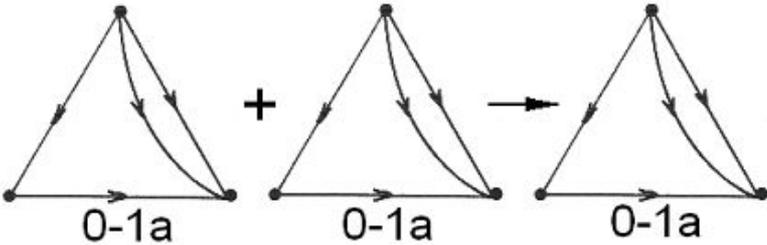
Тенденции изменения значений отклика



Переходы топологических структур диаграмм

| | |
|--|---|
| $0-1a \leftrightarrow 1-1a (1-1b) (Z_1 \leftrightarrow Z_2 + C_1)$ | $0-1a \leftrightarrow 1-2a (C_1 \leftrightarrow C_2 + Z_1)$ |
| $1-1a \leftrightarrow 2-1a (Z_1 \leftrightarrow Z_2 + C_1)$ | $1-1a \leftrightarrow 2-2a (2-2b, 2-2c) (C_1 \leftrightarrow C_2 + Z_1)$ |
| $1-1a \leftrightarrow 1.1-1a (Z_2 \leftrightarrow Z_3 + C_2)$ | $1-1b \leftrightarrow 2-1a (Z_1 \leftrightarrow Z_2 + C_1)$ |
| $1-1b \leftrightarrow 2-2b (2-2c) (C_1 \leftrightarrow C_2 + Z_1)$ | $1-1b \leftrightarrow 1.1-1b (Z_2 \leftrightarrow Z_3 + C_2)$ |
| $1-2a \leftrightarrow 2-2a (2-2b, 2-2c) (Z_1 \leftrightarrow Z_2 + C_1)$ | $1-2a \leftrightarrow 1.1-2a (C_2 \leftrightarrow C_3 + Z_2)$ |
| $1.1-1a \leftrightarrow 2.1-1a (Z_1 \leftrightarrow Z_2 + C_1)$ | $1.1-1a \leftrightarrow 2.1-2a (2.1-2b\alpha, \beta) (C_1 \leftrightarrow C_2 + Z_1)$ |
| $1.1-1b \leftrightarrow 2.1-1a (Z_1 \leftrightarrow Z_2 + C_1)$ | $1.1-1b \leftrightarrow 2.1-2a (2.1-2b\alpha, \beta) (C_1 \leftrightarrow C_2 + Z_1)$ |
| $1.1-2a \leftrightarrow 2.1-3a (2.1-3b) (Z_1 \leftrightarrow Z_2 + C_1)$ | $2-1a \leftrightarrow 3-1a (3-1b) (C_1 \leftrightarrow C_2 + Z_1)$ |
| $2-1a \leftrightarrow 2.1-1a (Z_2 \leftrightarrow Z_3 + C_2)$ | $2-2a \leftrightarrow 3-1a (3-1b) (Z_1 \leftrightarrow Z_2 + C_1)$ |
| $2-2a \leftrightarrow 3-2a (C_1 \leftrightarrow C_2 + Z_1)$ | $2-2a \leftrightarrow 2.1-2a (Z_2 \leftrightarrow Z_3 + C_2)$ |
| $2-2a \leftrightarrow 2.1-3a (C_2 \leftrightarrow C_3 + Z_2)$ | $2-2b \leftrightarrow 3-1b (Z_1 \leftrightarrow Z_2 + C_1)$ |
| $2-2b \leftrightarrow 3-2a (C_1 \leftrightarrow C_2 + Z_1)$ | $2-2b \leftrightarrow 2.1-2b\alpha (Z_2 \leftrightarrow Z_3 + C_2)$ |
| $2-2b \leftrightarrow 2.1-3b (C_2 \leftrightarrow C_3 + Z_2)$ | $2-2c \leftrightarrow 3-1b (Z_1 \leftrightarrow Z_2 + C_1)$ |
| $2-2c \leftrightarrow 3-2a (C_1 \leftrightarrow C_2 + Z_1)$ | $2-2c \leftrightarrow 2.1-2b\beta (Z_2 \leftrightarrow Z_3 + C_2)$ |
| $2-2c \leftrightarrow 2.1-3b (C_2 \leftrightarrow C_3 + Z_2)$ | $2.1-1a \leftrightarrow 3.1-1a (3.1-1b\alpha, \beta) (C_1 \leftrightarrow C_2 + Z_1)$ |
| $2.1-2a \leftrightarrow 3.1-1b\alpha (3.1-1b\beta) (Z_1 \leftrightarrow Z_2 + C_1)$ | $2.1-2a \leftrightarrow 3.1-2a (C_1 \leftrightarrow C_2 + Z_1)$ |
| $2.1-2b\alpha \leftrightarrow 3.1-1a (3.1-1b\alpha) (Z_1 \leftrightarrow Z_2 + C_1)$ | $2.1-2b\alpha \leftrightarrow 3.1-2a (C_1 \leftrightarrow C_2 + Z_1)$ |
| $2.1-2b\beta \leftrightarrow 3.1-1a (3.1-1b\beta) (Z_1 \leftrightarrow Z_2 + C_1)$ | $2.1-2b\beta \leftrightarrow 3.1-2a (C_1 \leftrightarrow C_2 + Z_1)$ |
| $2.1-3a \leftrightarrow 3.1-3a (Z_1 \leftrightarrow Z_2 + C_1)$ | $2.1-3a \leftrightarrow 3.1-4a\alpha (3.1-4a\beta) (C_1 \leftrightarrow C_2 + Z_1)$ |
| $2.1-3b \leftrightarrow 3.1-3a (Z_1 \leftrightarrow Z_2 + C_1)$ | $2.1-3b \leftrightarrow 3.1-4a\alpha (3.1-4a\beta) (C_1 \leftrightarrow C_2 + Z_1)$ |
| $3-1a \leftrightarrow 3.1-1b\beta (Z_2 \leftrightarrow Z_3 + C_2)$ | $3-1a \leftrightarrow 3.1-3a (C_2 \leftrightarrow C_3 + Z_2)$ |
| $3-1b \leftrightarrow 3.1-1a (3.1-1b\alpha) (Z_2 \leftrightarrow Z_3 + C_2)$ | $3-1b \leftrightarrow 3.1-3a (C_2 \leftrightarrow C_3 + Z_2)$ |
| $3-2a \leftrightarrow 3.1-2a (Z_2 \leftrightarrow Z_3 + C_2)$ | $3-2a \leftrightarrow 3.1-4a\alpha (3.1-4a\beta) (C_2 \leftrightarrow C_3 + Z_2)$ |

Способы формирования диаграммы 0-1a



Способы формирования диаграмм

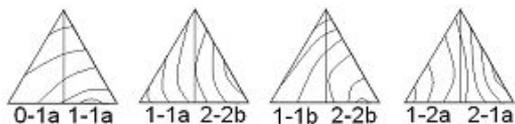


Диаграмма 1-1a



Диаграмма 1-1b

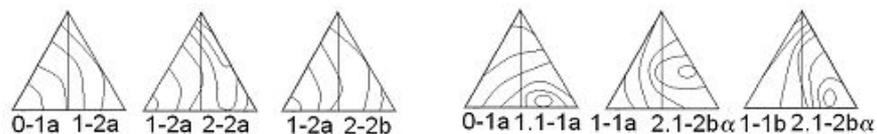


Диаграмма 1-2a

Диаграмма 1.1-1a

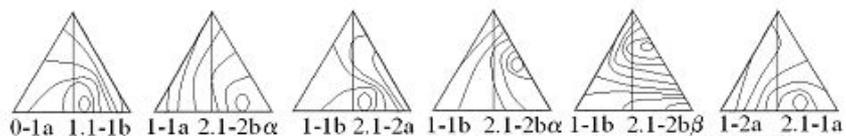


Диаграмма 1.1-1b

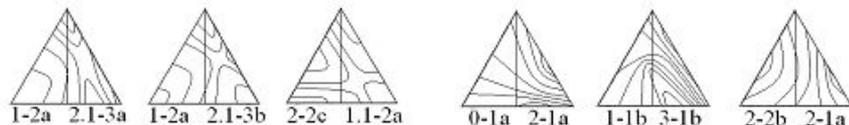


Диаграмма 1.1-2a

Диаграмма 2-1a

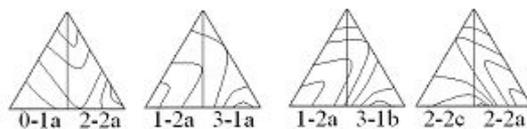
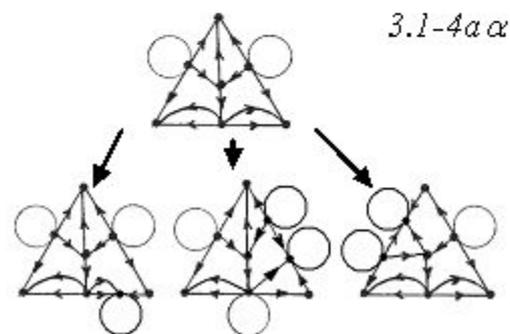
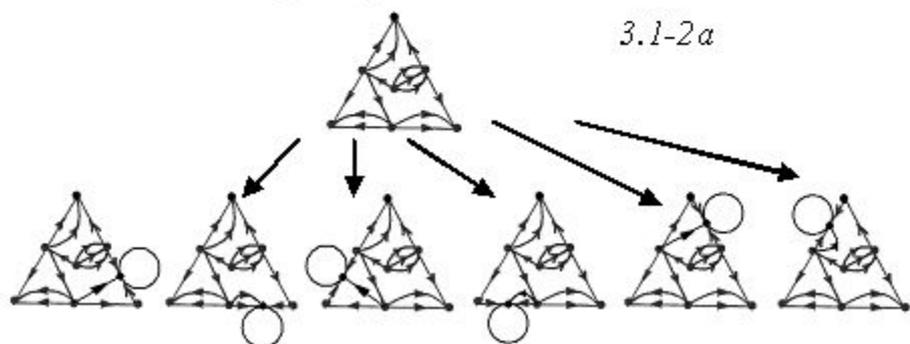
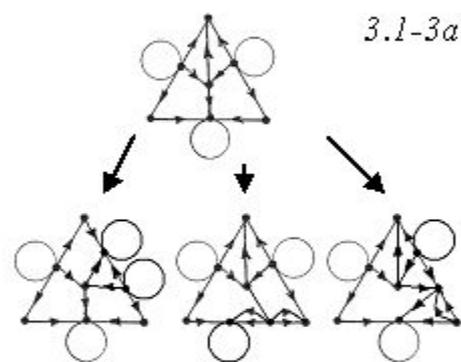
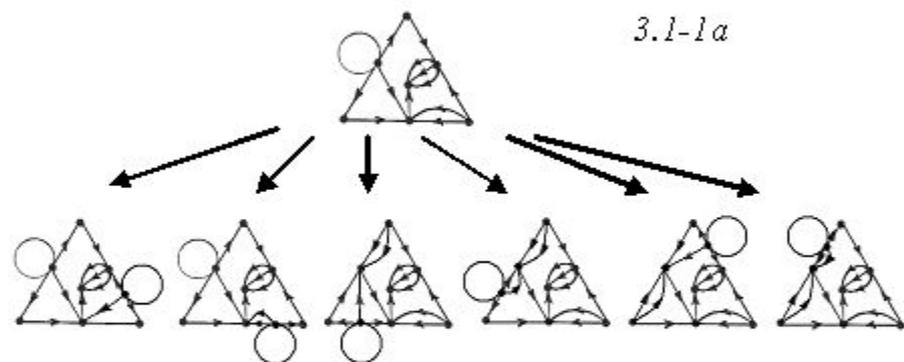
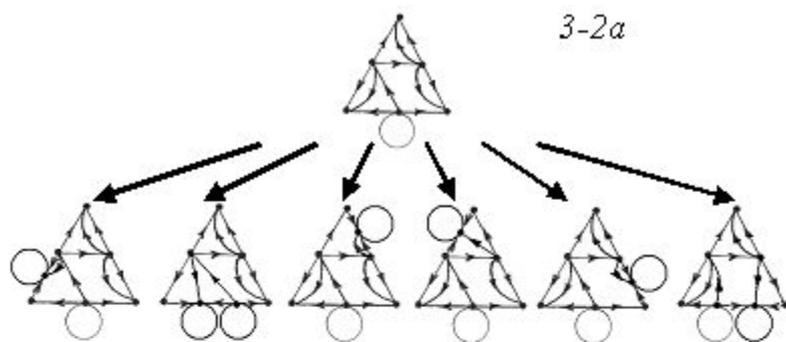
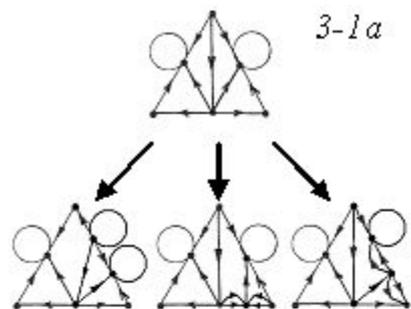
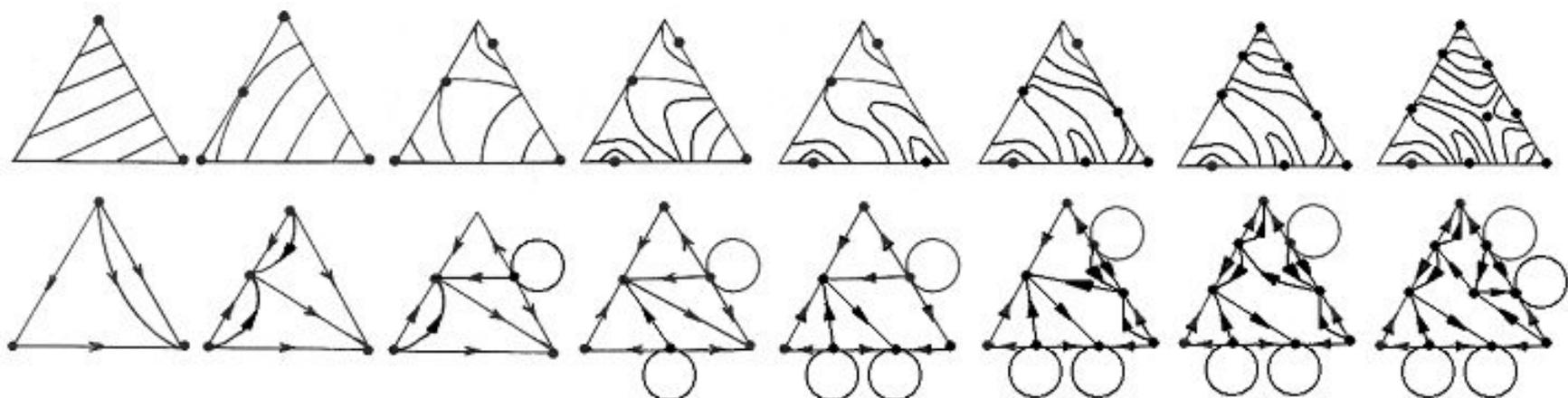


Диаграмма 2-2a

Примеры формирования диаграмм четвертого класса



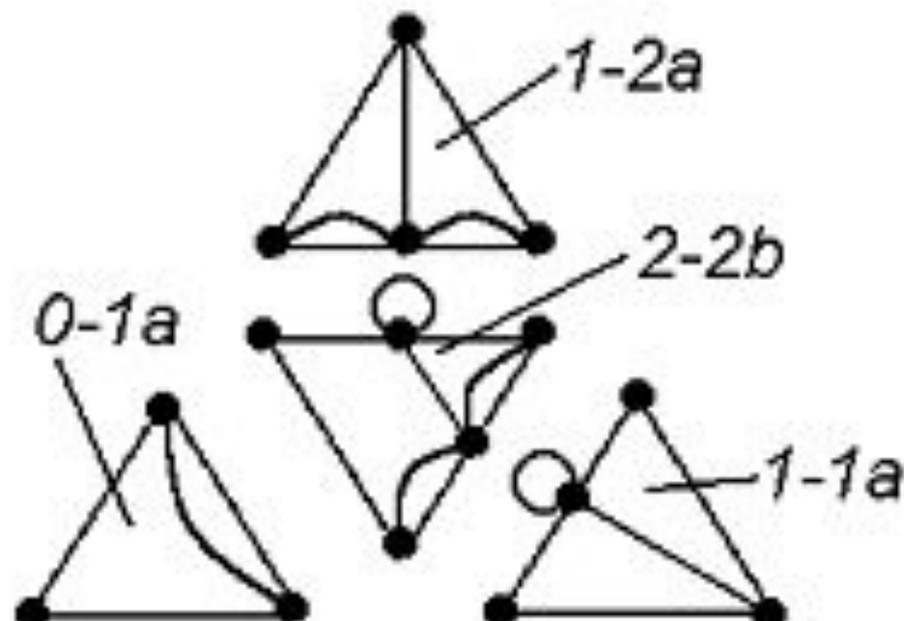
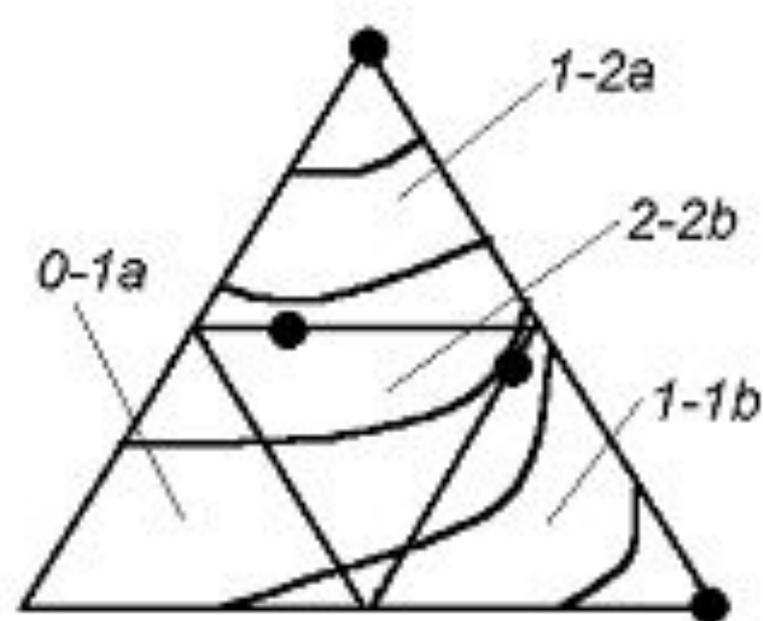
Последовательный ряд диаграмм состав-свойство



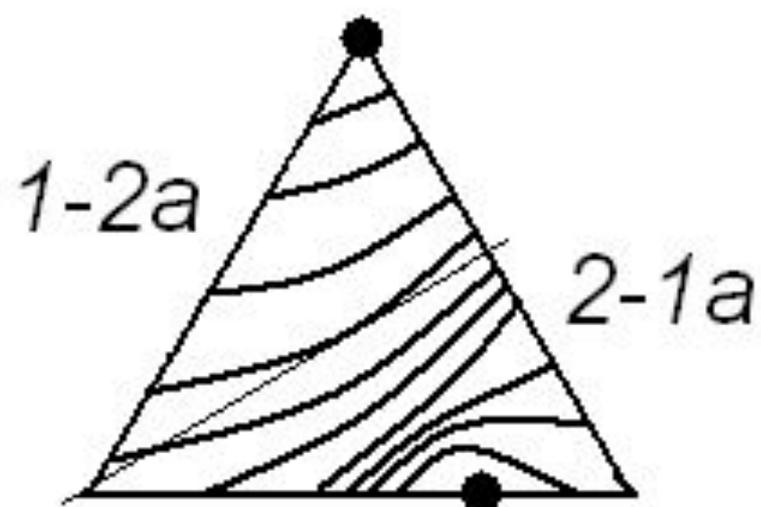
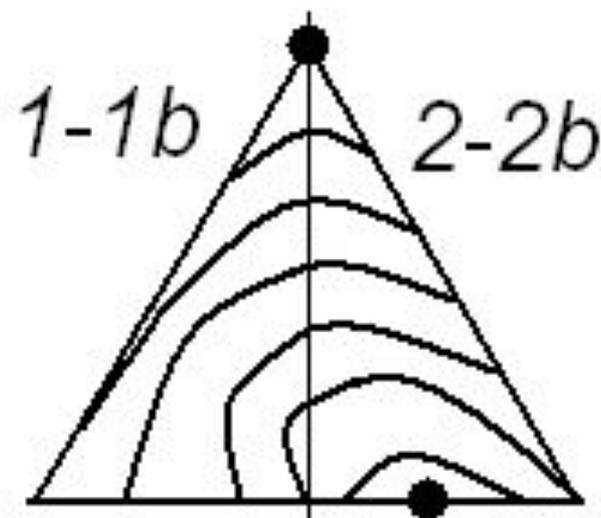
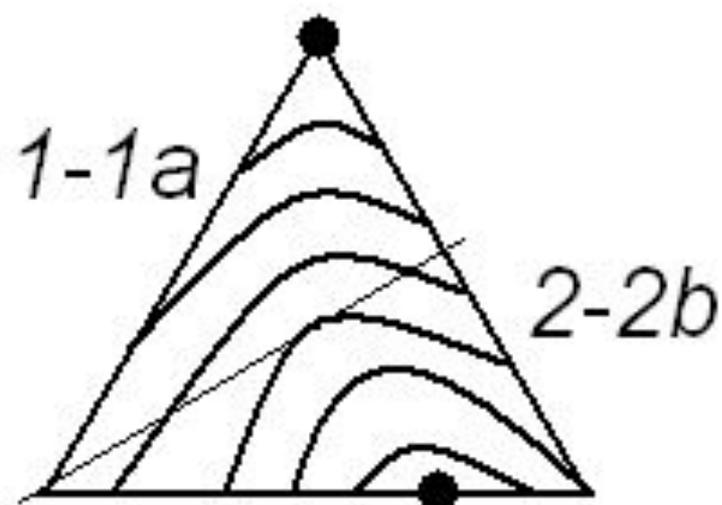
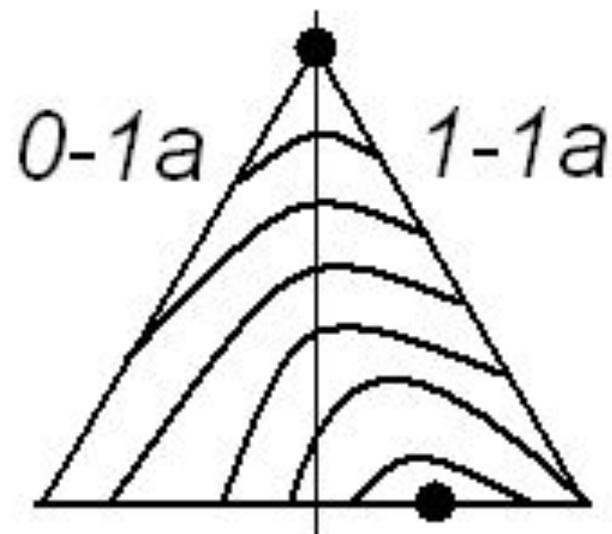
$$C_1 \leftrightarrow C_2 + Z_1 \quad Z_1 \leftrightarrow Z_2 + C_1 \quad Z_1 \leftrightarrow Z_2 + C_1 \quad Z_1 \leftrightarrow Z_2 + C_1 \quad C_1 \leftrightarrow C_2 + Z_1 \quad C_1 \leftrightarrow C_2 + Z_1 \quad C_2 \leftrightarrow C_3 + Z_2$$

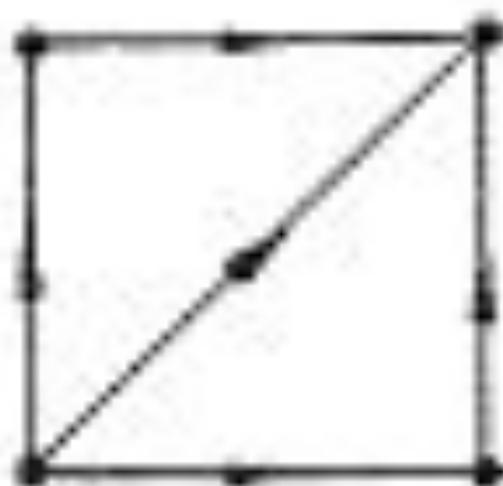
Класс 0 Класс 1 Класс 2 Класс 3 Класс 4 Класс 5 Класс 6 Класс 6.1

Объединение симплексов



Объединение симплексов





0-1a



0-1b

Индекс Ранديча для графа *0-1a*

$$4 \cdot (1/\sqrt{3}) \cdot (1/\sqrt{2}) + 1 \cdot (1/\sqrt{3}) \cdot (1/\sqrt{3}) = 1.967,$$

а для графа *0-1b* –

$$2 \cdot (1/\sqrt{3}) \cdot (1/\sqrt{2}) + 2 \cdot (1/\sqrt{3}) \cdot (1/\sqrt{3}) + 1 \cdot (1/\sqrt{2}) \cdot (1/\sqrt{2}) = 1.983.$$

Значения индексов Рандича для графов первой группы ($Z_3=0, C_3=0$)

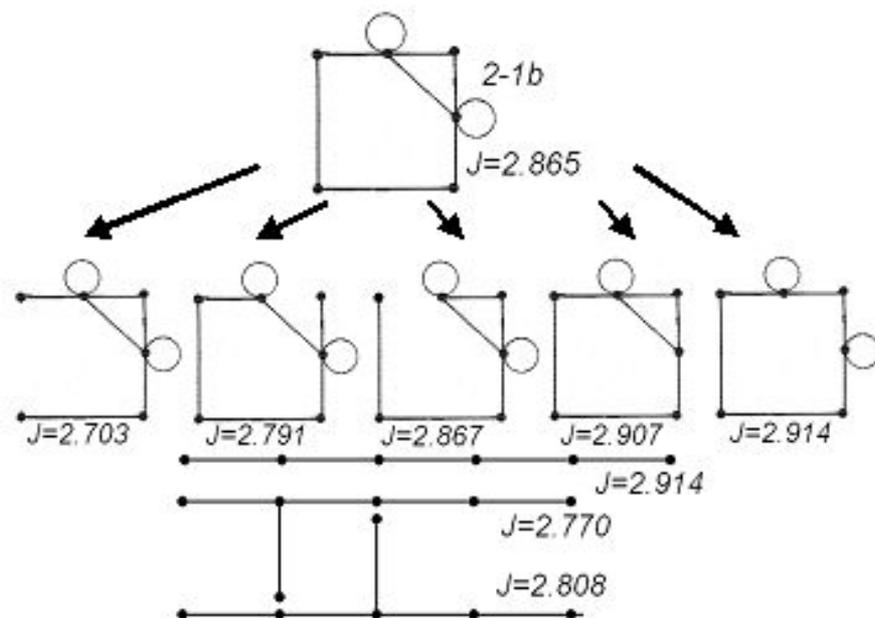
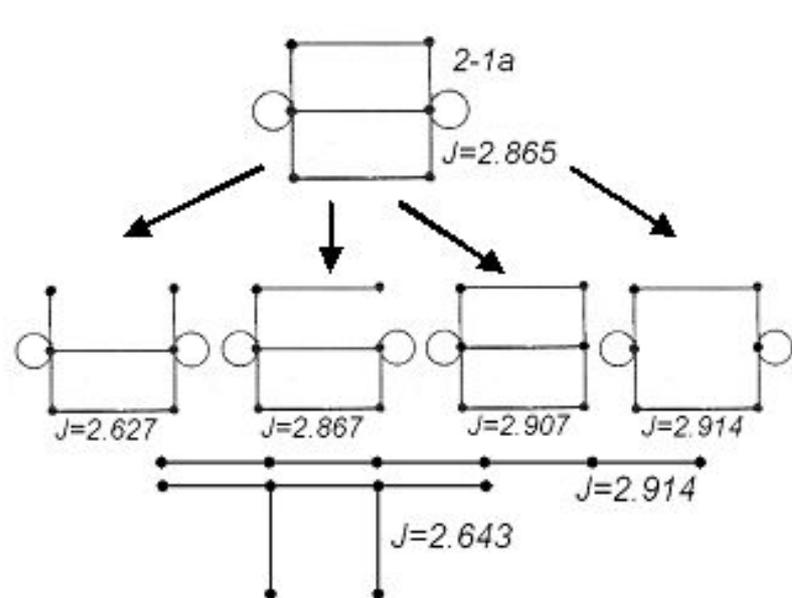
| Класс | Тип | Подтип | Индекс | Подтип | Индекс | $S^2 \cdot 10^4$ |
|-------|-----|----------------------------|--------|----------------------|--------|------------------|
| 0 | 1 | <i>a</i> | 1.967 | <i>b</i> | 1.983 | 1.3 |
| 1 | 1 | <i>a</i> | 2.407 | <i>b</i> | 2.441 | 2.6 |
| | 2 | <i>a</i> | 2.424 | <i>b</i> | 2.441 | |
| 2 | 1 | <i>a, b</i> | 2.865 | | | 6.6 |
| | 2 | <i>a, b</i> | 2.865 | <i>c, d, e, f, g</i> | 2.882 | |
| | | <i>h</i> | 2.899 | <i>i, j</i> | 2.916 | |
| 3 | 3 | <i>a, b</i> | 2.932 | | | |
| 3 | 1 | <i>a, b, c</i> | 3.306 | <i>d, e, f</i> | 3.340 | 9.6 |
| | 2 | <i>a, b, c</i> | 3.373 | <i>d, e, f</i> | 3.390 | |
| 4 | 1 | <i>a</i> | 3.730 | | | 18.8 |
| | 2 | <i>a, b, c, d, e, f, g</i> | 3.814 | | | |
| | 3 | <i>a</i> | 3.898 | | | |

Значения индексов Рандича для графов второй группы ($Z_3=1, C_3=0$)

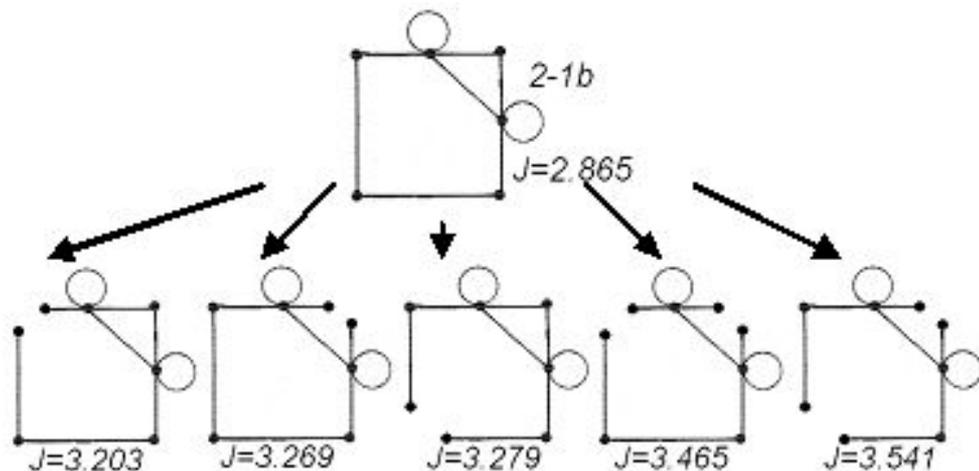
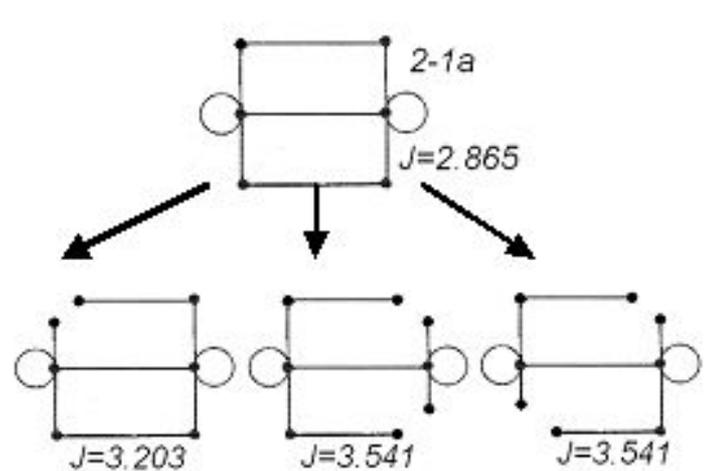
| Класс | Тип | Подтип | Индекс | Подтип | Индекс | $S^2 \cdot 10^4$ |
|-------|-----|-------------------|--------|----------------|--------|------------------|
| 0.1 | 1 | <i>a</i> | 2.000 | | | – |
| 1.1 | 1 | <i>a</i> | 2.909 | <i>b</i> | 2.942 | 5.4 |
| | 1 | <i>a, b</i> | 3.359 | | | |
| 2.1 | 2 | <i>a</i> | 3.318 | <i>b</i> | 3.359 | 6.0 |
| | | <i>c, d, e, f</i> | 3.376 | <i>g</i> | 3.410 | |
| 3.1 | 1 | <i>a, b, c</i> | 3.800 | <i>d, e, f</i> | 3.834 | 11.1 |
| | 2 | <i>a</i> | 3.868 | <i>b</i> | 3.885 | |
| 4.1 | 1 | <i>a, b</i> | 4.224 | | | 16.8 |
| | 2 | <i>a, b, c, d</i> | 4.309 | | | |
| | 3 | <i>a</i> | 4.393 | | | |

Значения индексов Рандича для графов третьей группы ($Z_3=0, C_3=1$)

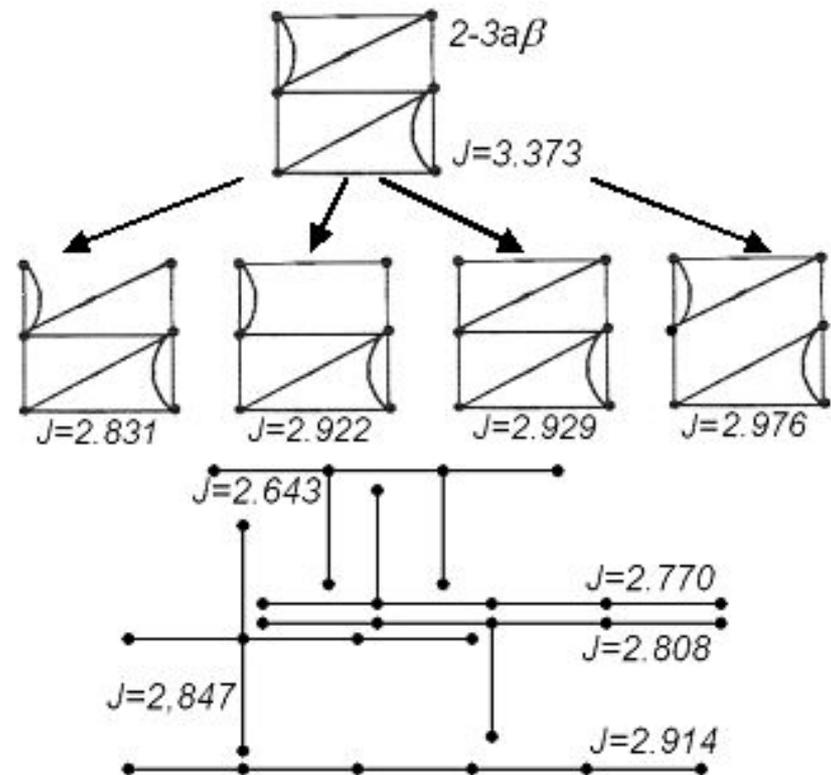
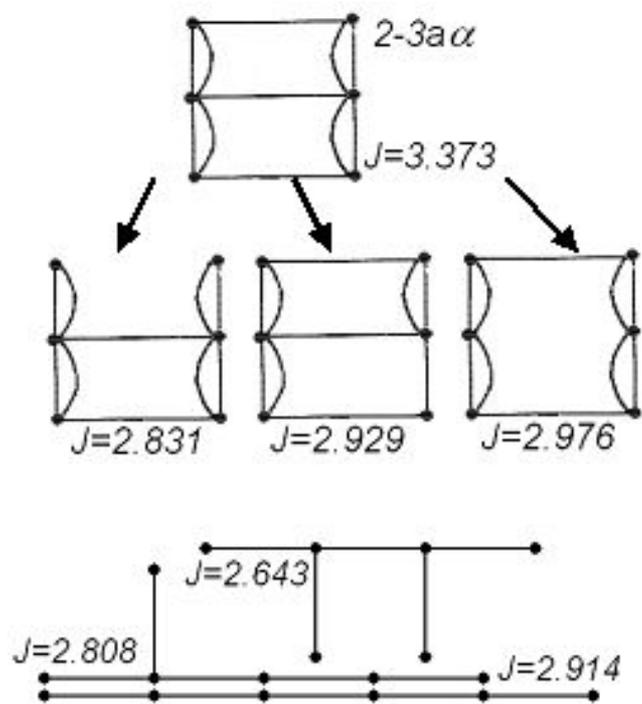
| Класс | Тип | Подтип | Индекс | Подтип | Индекс | $S^2 \cdot 10^4$ |
|-------|-----|---------------------|--------|----------------------------------|--------|------------------|
| 0.1 | 2 | a | 2.488 | | | – |
| 1.1 | 2 | a | 2.939 | b | 2.956 | 1.4 |
| 2.1 | 3 | a | 3.373 | b, c, d, e | 3.390 | 7.2 |
| | | f | 3.407 | g | 3.424 | |
| | | a | 3.440 | | | |
| 3.1 | 3 | a | 3.807 | b | 3.841 | 5.4 |
| | | $a(\alpha)$ | 3.875 | $a(\beta, \gamma)$ | 3.881 | |
| | 4 | $b(\alpha, \beta)$ | 3.875 | $b(\gamma)$ | 3.881 | |
| | | c | 3.881 | | | |
| | | $d, e, f(\alpha)$ | 3.891 | $d, e, f(\beta, \gamma)$ | 3.898 | |
| 4.1 | 4 | a | 4.224 | | | 30.2 |
| | | $a(\alpha)$ | 4.309 | $a(\beta)$ | 4.316 | |
| | 5 | $b(\alpha)$ | 4.316 | $b(\beta)$ | 4.322 | |
| | | $c(\alpha, \beta)$ | 4.316 | $c(\gamma)$ | 4.322 | |
| | | d | 4.316 | | | |
| | | $a(\alpha)$ | 4.393 | $a(\beta)$ | 4.400 | |
| | 6 | $a(\gamma, \delta)$ | 4.407 | | | |
| | | $b(\alpha, \beta)$ | 4.400 | $b(\gamma, \delta, \varepsilon)$ | 4.407 | |



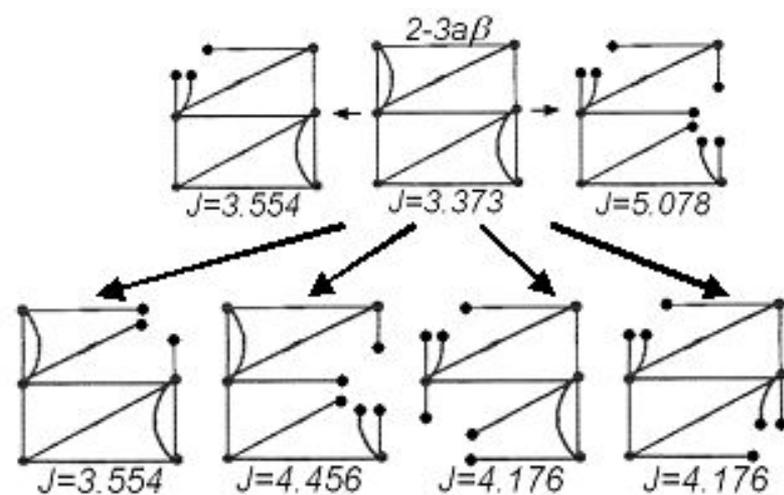
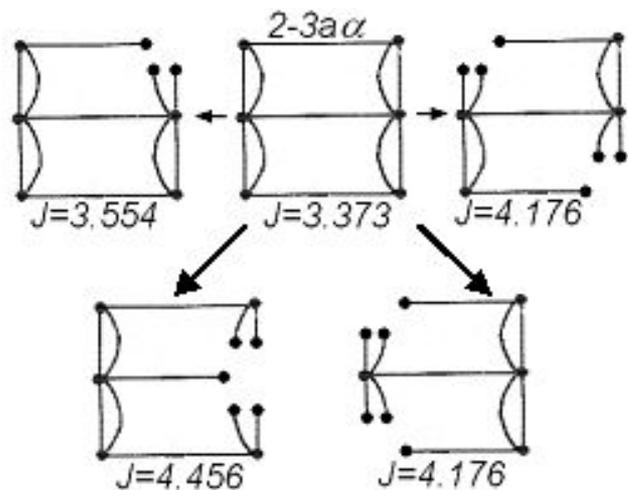
Идентификация подтипов диаграмм при формировании суграфов при исключении одного ребра и созданием покрывающих деревьев в исключении четырех ребер



Идентификация подтипов диаграмм путем «стирания» одной или двух вершин



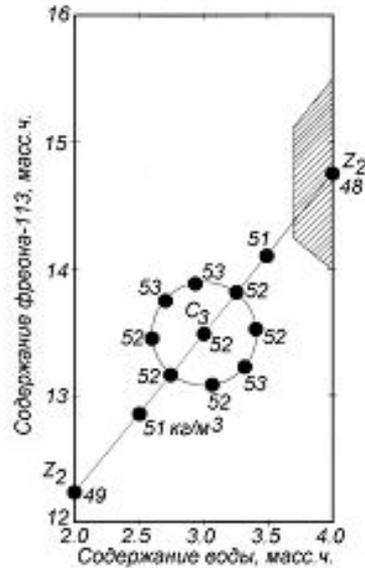
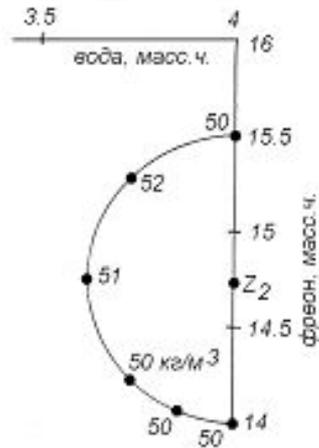
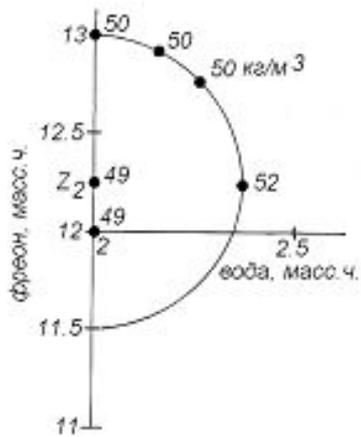
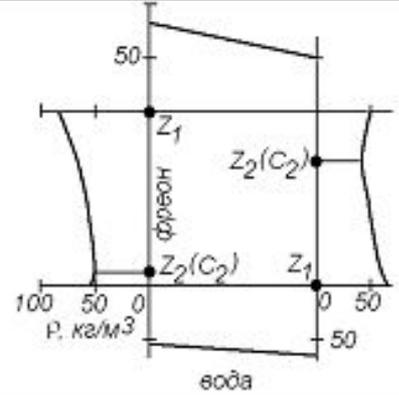
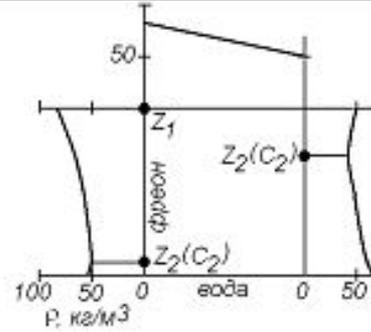
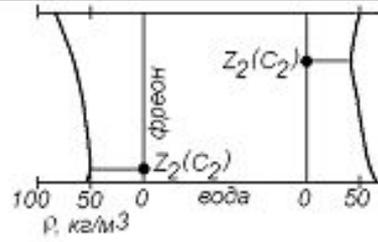
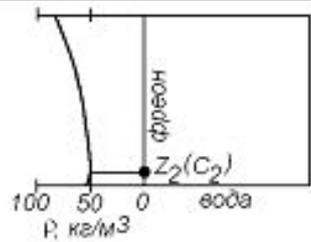
Идентификация видов диаграмм при формировании суграфов при исключении одного ребра и созданием покрывающих деревьев исключением шести ребер графа



Идентификация видов диаграмм путем «стирания» одной или двух вершин

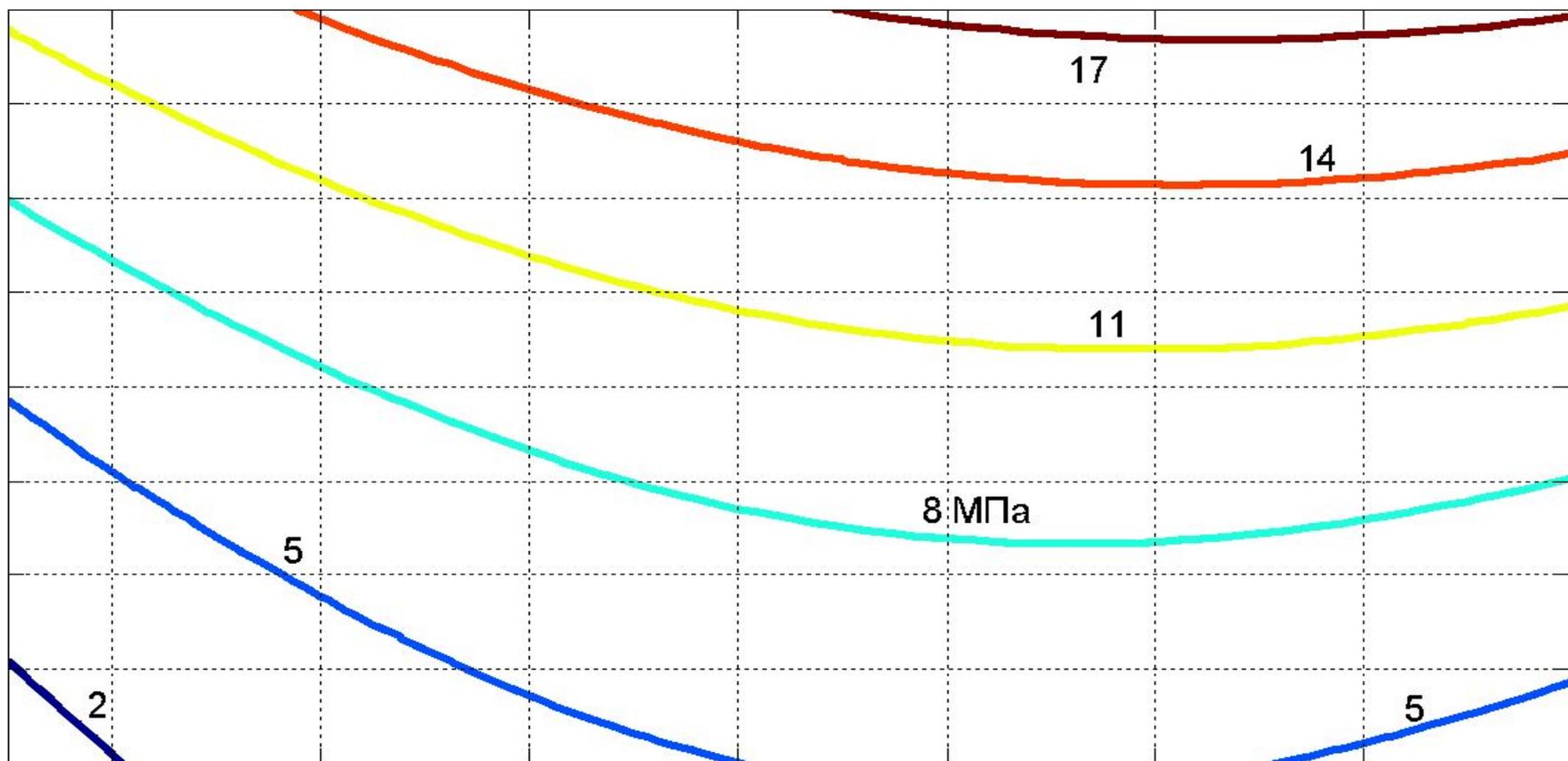
Значения индексов Рандича для графов диаграмм состав-свойство

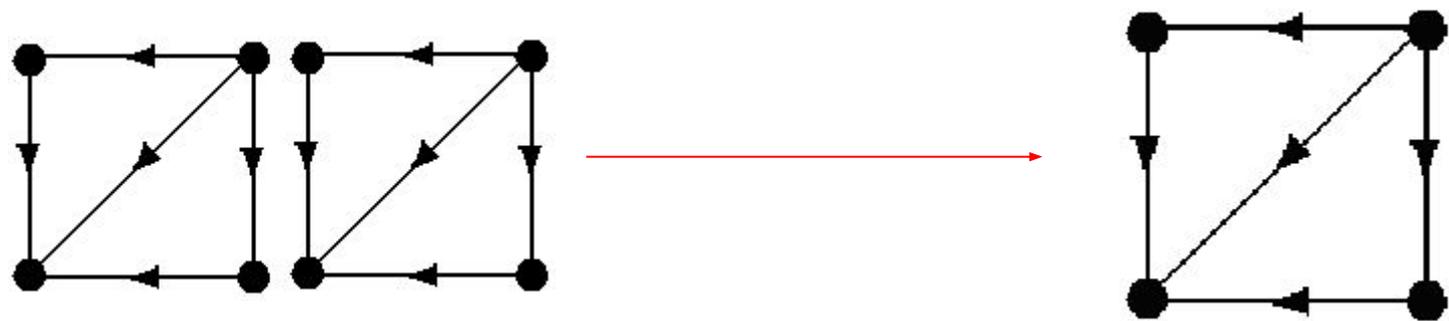
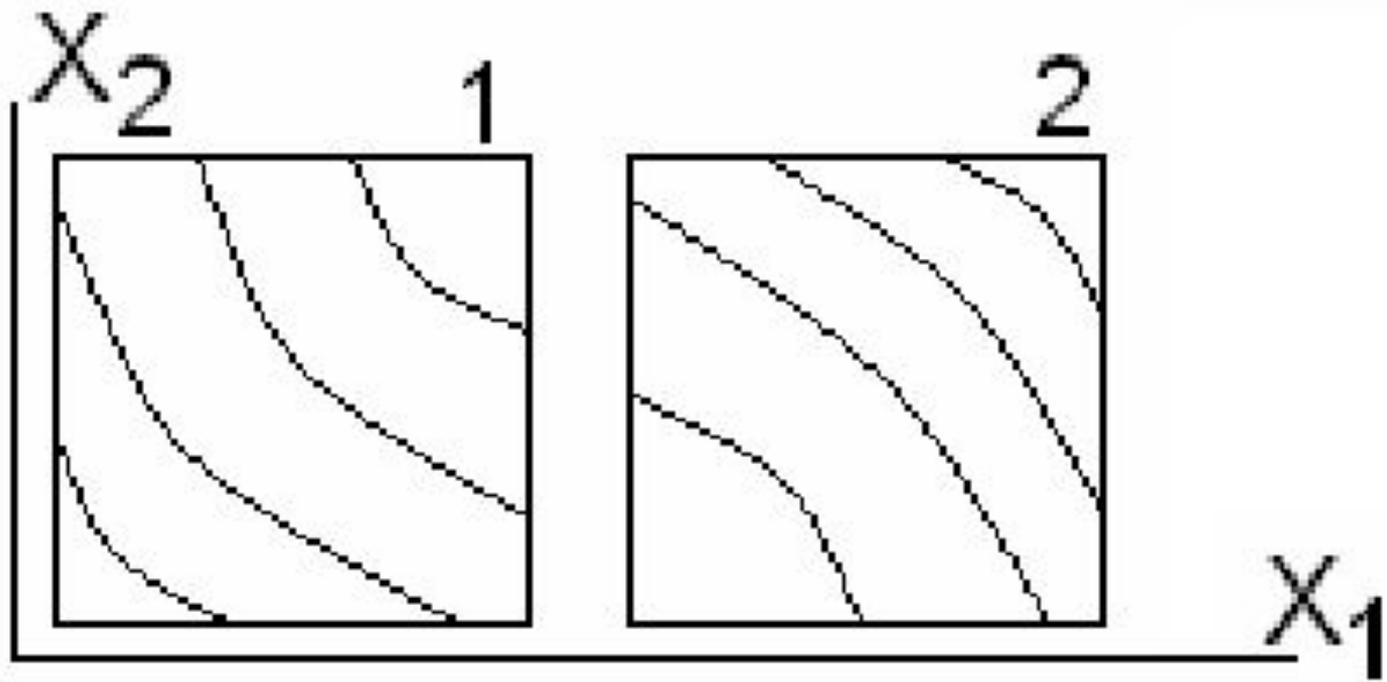
| Диаграмма | Индекс | Диаграмма | Индекс | Диаграмма | Индекс |
|-------------|--------|----------------------------------|--------|----------------------------------|--------|
| <i>0-1a</i> | 1.483 | <i>0.1-1a</i> | 2.000 | <i>1.1-2a</i> | 2.473 |
| <i>1-1a</i> | 1.907 | <i>1.1-1a</i> | 2.408 | <i>2.1-3a</i> | 2.907 |
| <i>1-1b</i> | 1.941 | <i>1.1-1b</i> | 2.442 | <i>2.1-3b</i> | 2.924 |
| <i>1-2a</i> | 1.958 | <i>2.1-1a</i> | 2.859 | <i>3.1-3a</i> | 3.341 |
| <i>2-1a</i> | 2.365 | <i>2.1-2a</i> | 2.893 | <i>3.1-4aα</i> | 3.425 |
| <i>2-2a</i> | 2.399 | <i>2.1-2bα</i> | 2.910 | <i>3.1-4aβ</i> | 3.432 |
| <i>2-2b</i> | 2.415 | <i>2.1-2bβ</i> | 2.910 | | |
| <i>2-2c</i> | 2.415 | <i>3.1-1a</i> | 3.334 | | |
| <i>3-1a</i> | 2.840 | <i>3.1-1bα</i> | 3.334 | | |
| <i>3-1b</i> | 2.840 | <i>3.1-1bβ</i> | 3.334 | | |
| <i>3-2a</i> | 2.924 | <i>3.1-2a</i> | 3.418 | | |



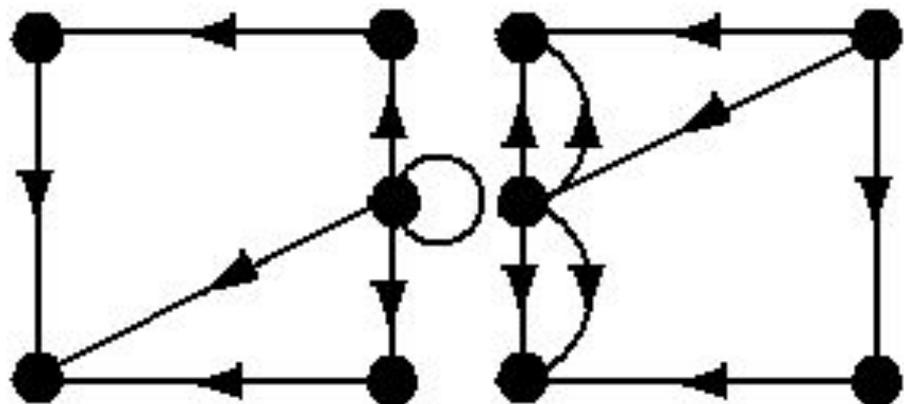
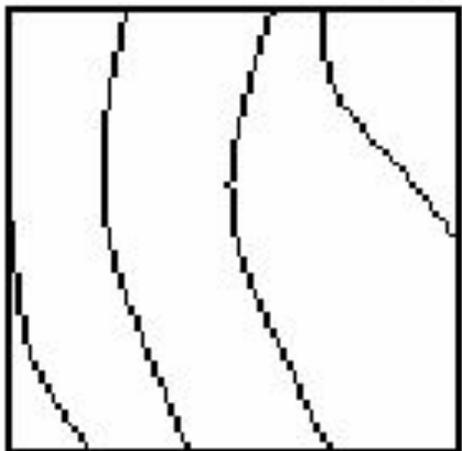
Прогнозирование

ЗАВИСИМОСТЬ УСЛОВНОГО НАПРЯЖЕНИЯ ПРИ УДЛИНЕНИИ 300% РЕЗИН НА ОСНОВЕ БСК ОТ ПРОДОЛЖИТЕЛЬНОСТИ ВУЛКАНИЗАЦИИ И СОДЕРЖАНИЯ ТЕХНИЧЕСКОГО УГЛЕРОДА

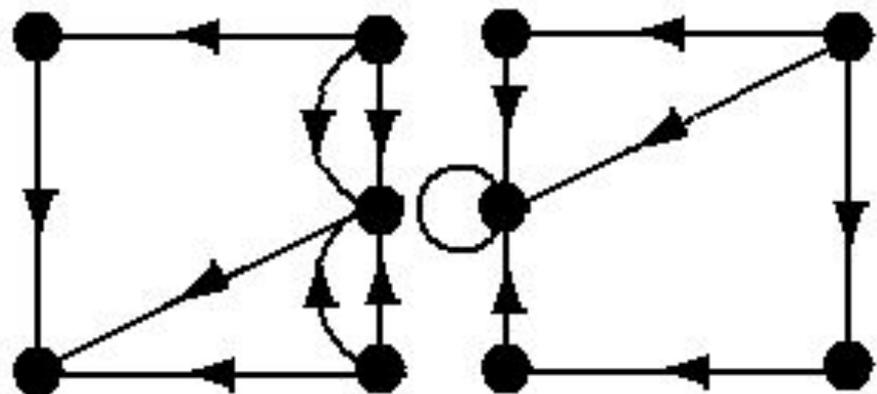
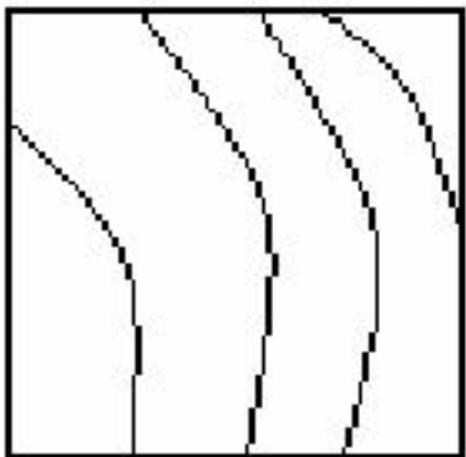




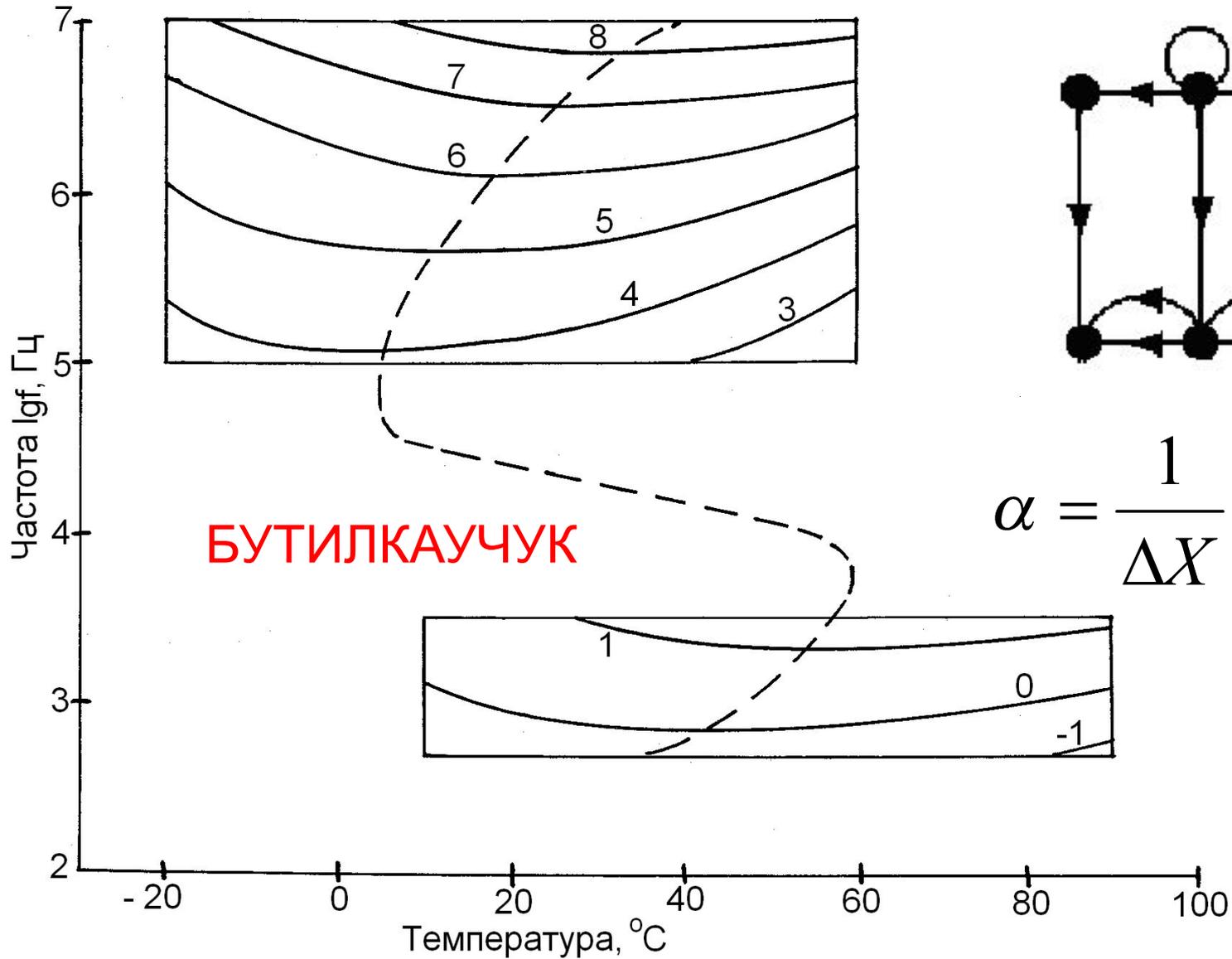
3



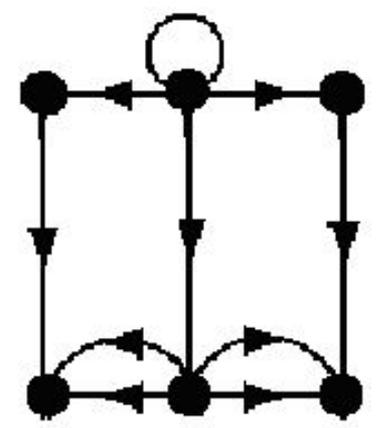
4

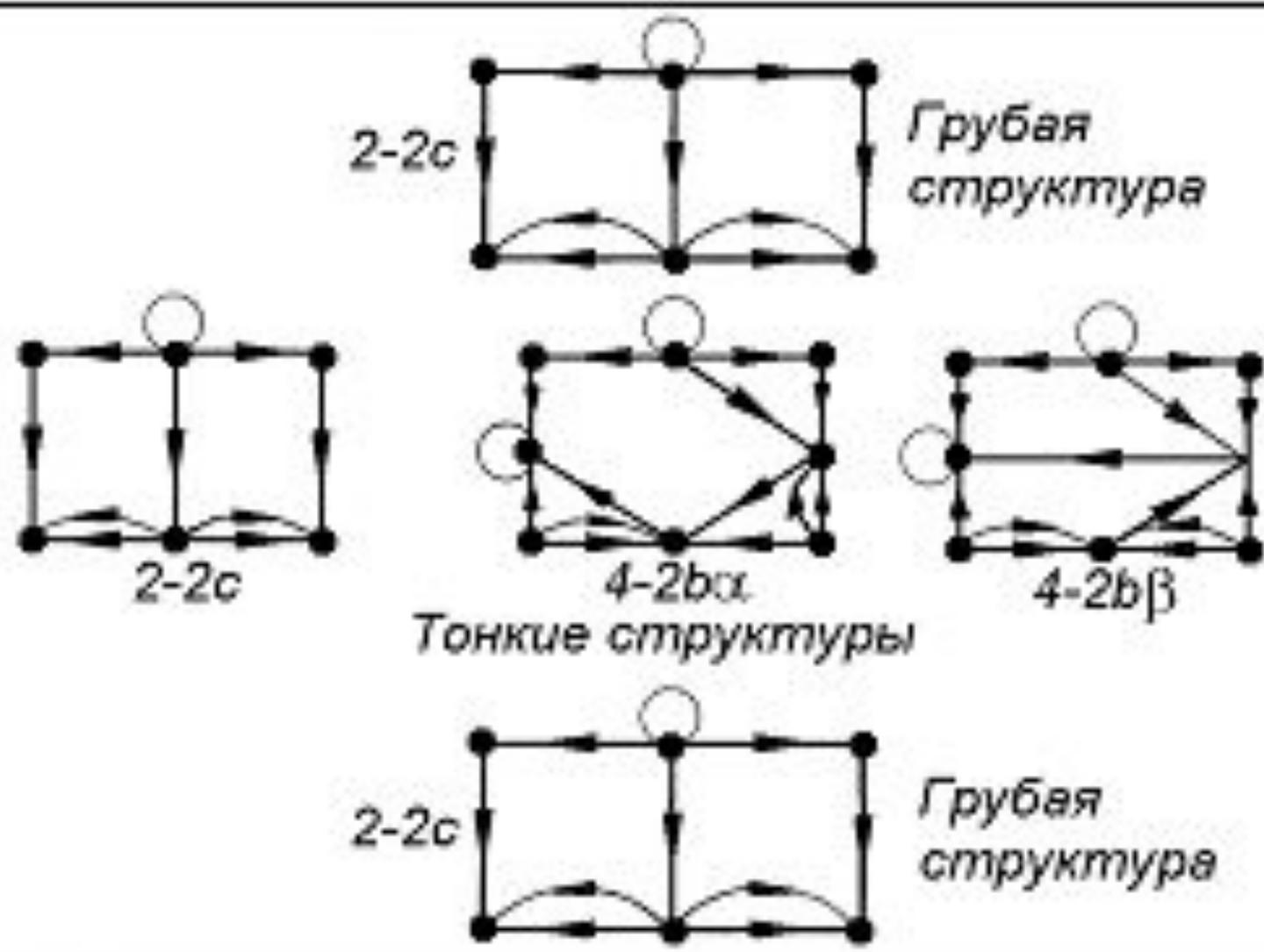


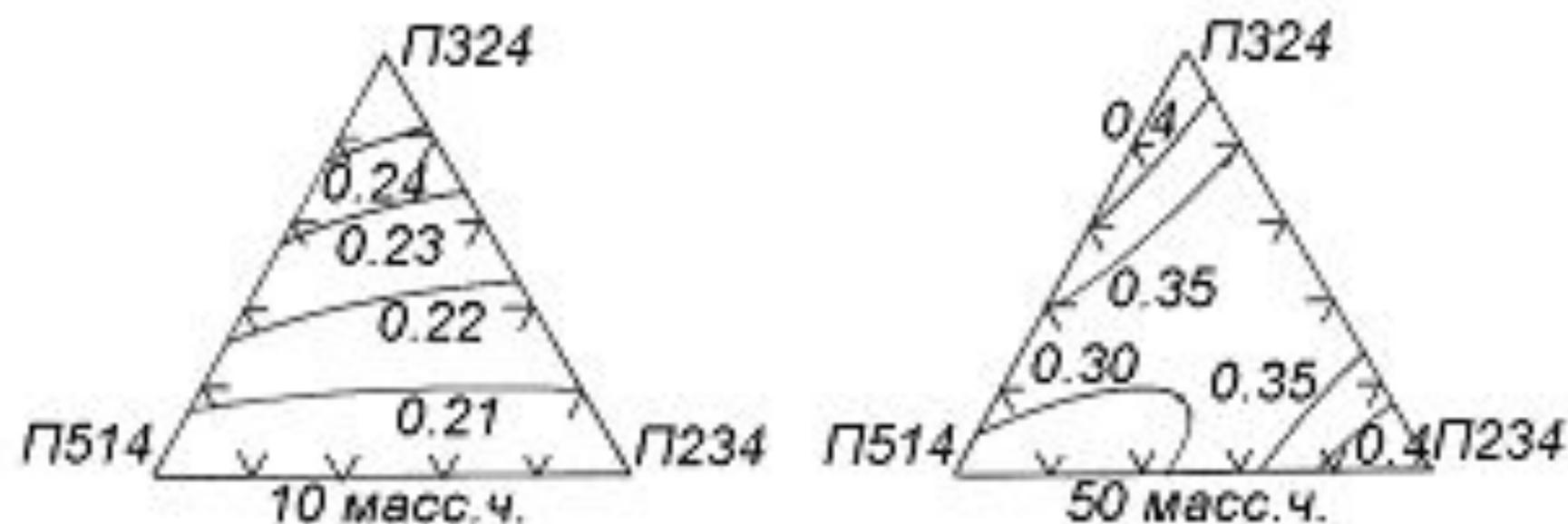
ЗАВИСИМОСТЬ КОЭФФИЦИЕНТА ПОГЛОЩЕНИЯ УЛЬТРАЗВУКА ОТ ТЕМПЕРАТУРЫ И ЧАСТОТЫ



$$\alpha = \frac{1}{\Delta X} \ln \frac{A'}{A''}$$

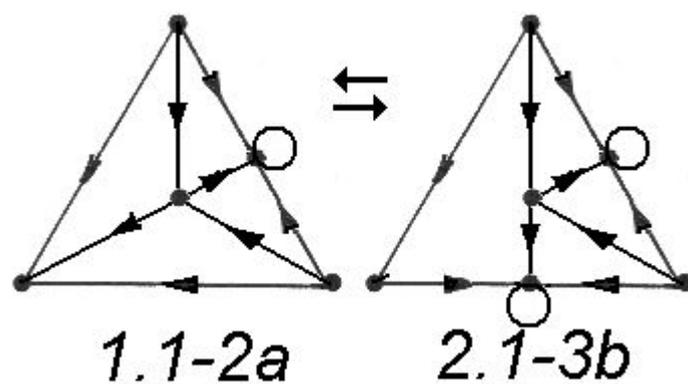
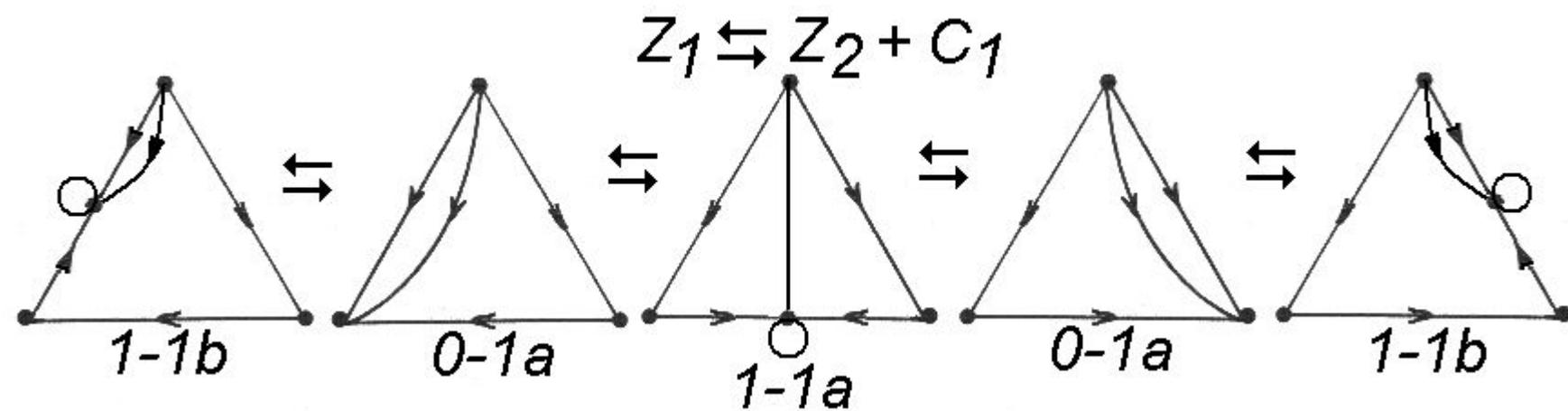


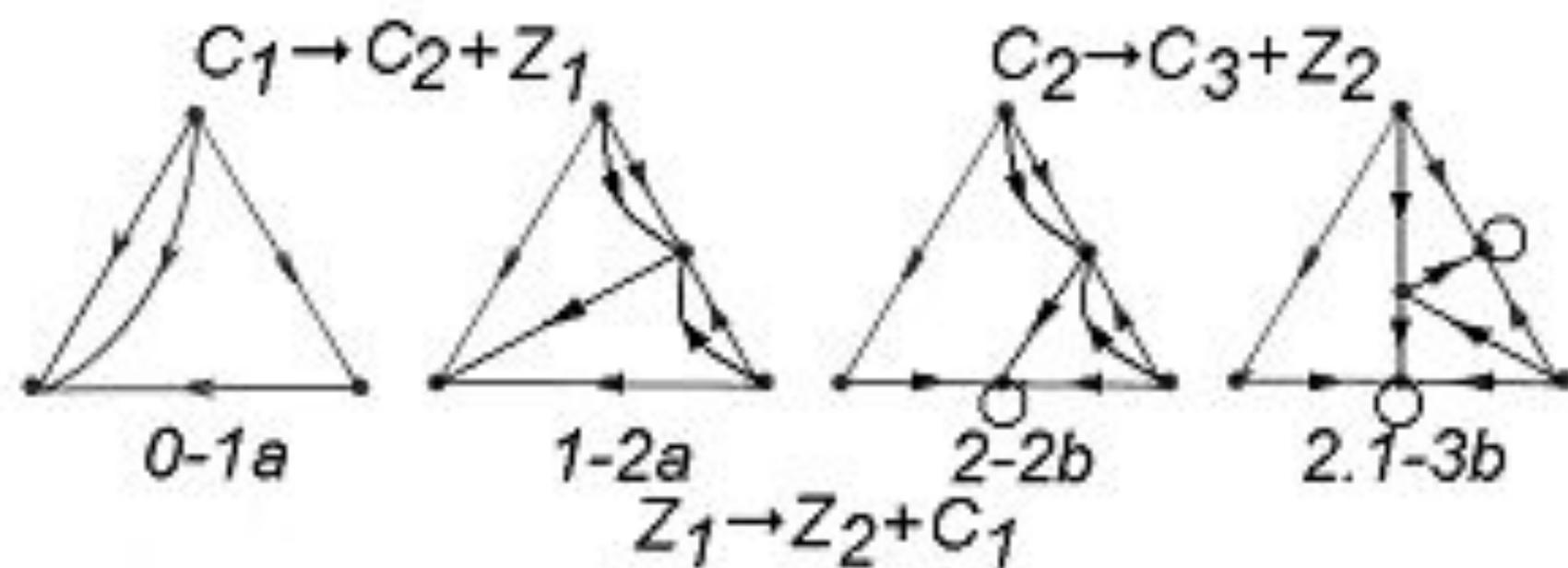




Диаграммы состав-свойств о
теплопроводности, Вт/(м·К)

Переходы в пределах погрешности



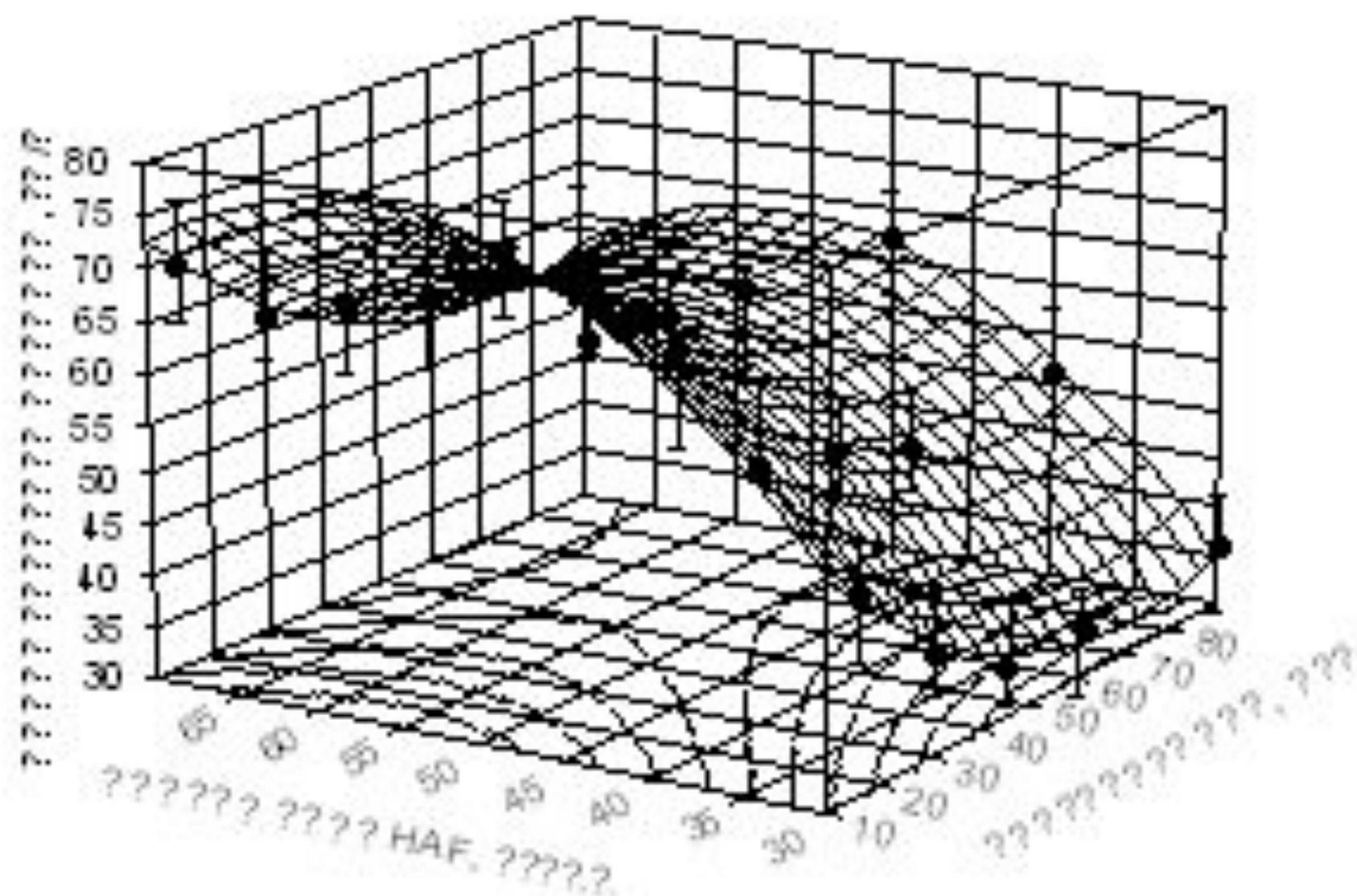


Метаморфозы диаграмм

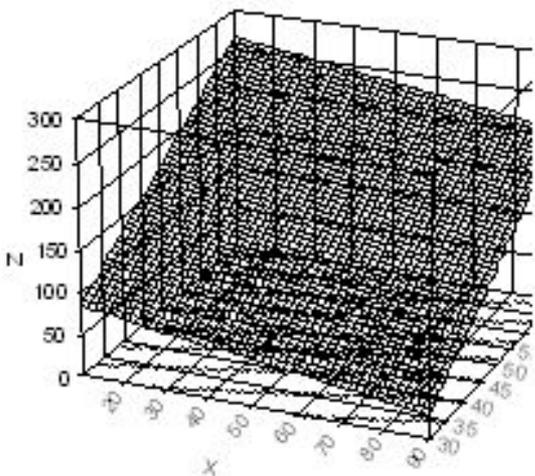


30 масс.ч.

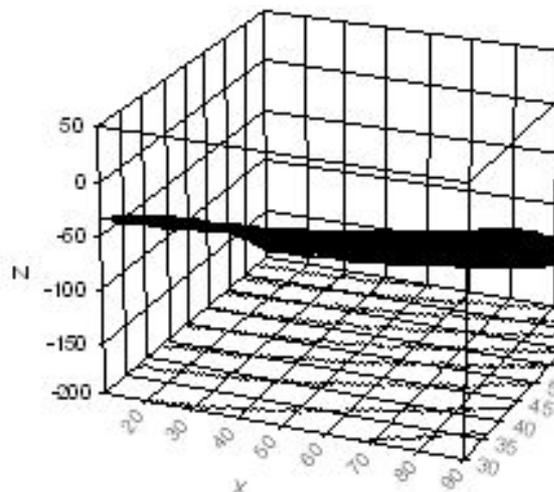
Эксперимент 2-2b



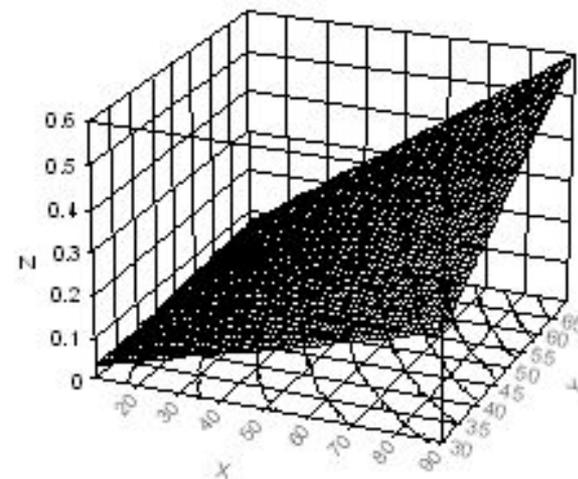
№ 301



$$z = -40.7184429 - 0.71462445 * x + 4.466883117 * y$$

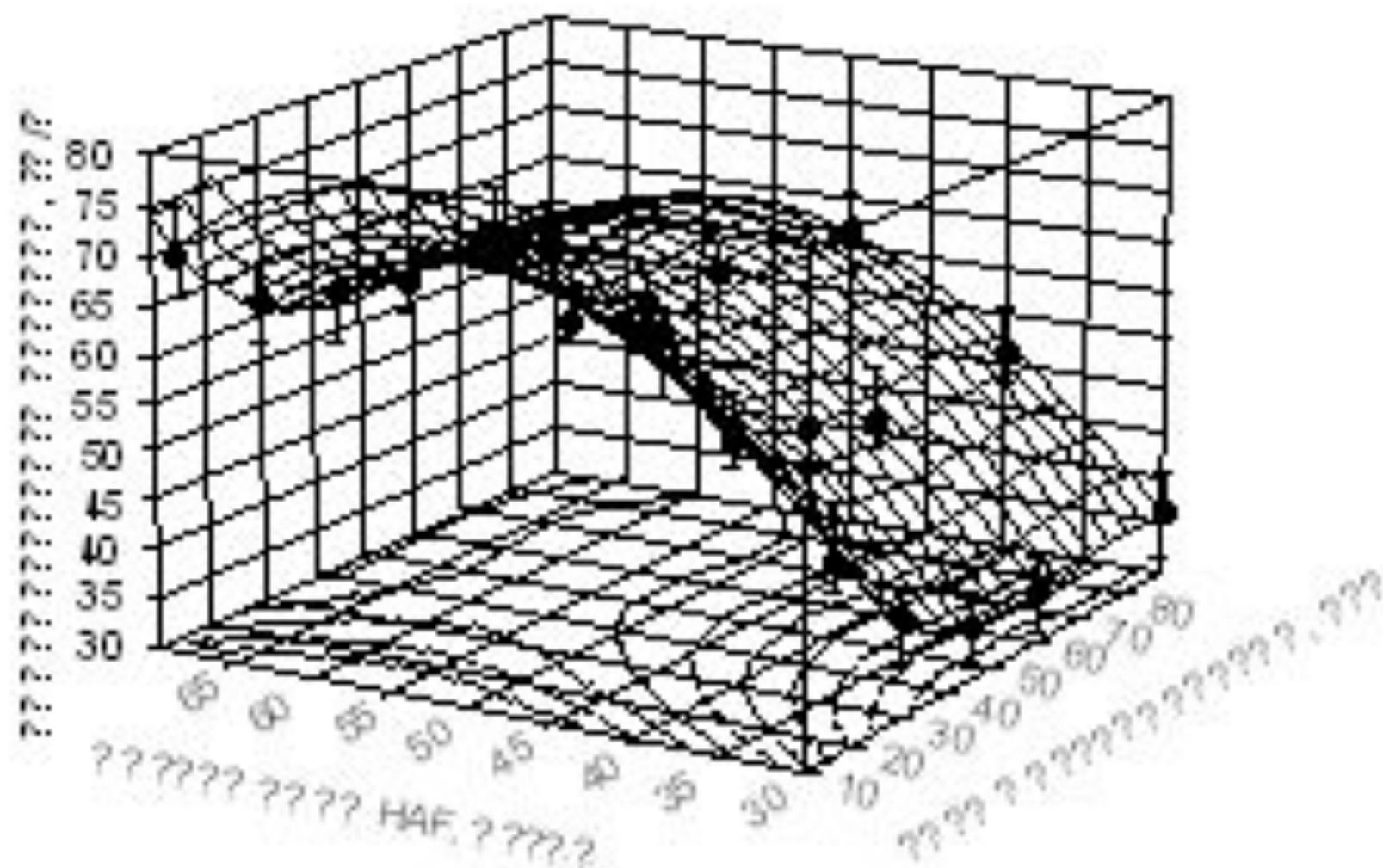


$$z = 0.005101456 * x^2 - 0.03936364 * y^2$$

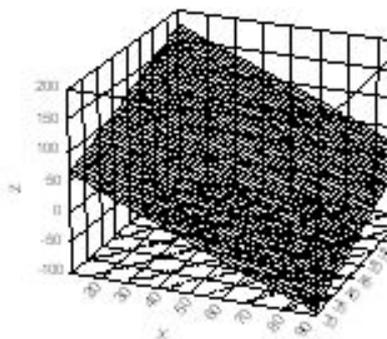


$$z = 9.52381e-05 * x * y$$

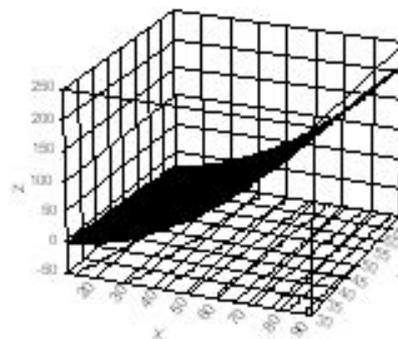
Фазовий аналіз моделі другого порядку.



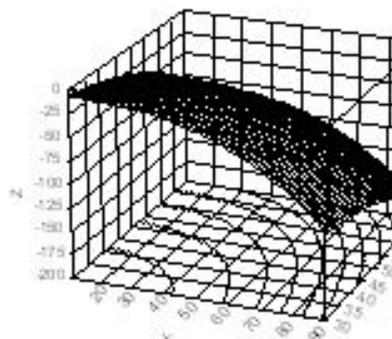
№ 310



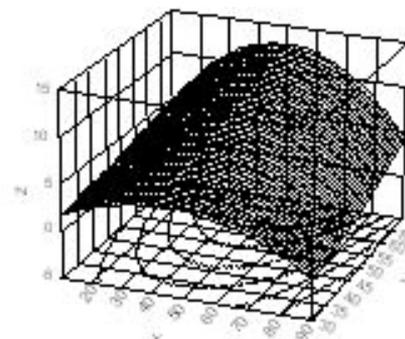
$$z = -1.15311077 - 1.97694254 * x + 2.804664826 * y$$



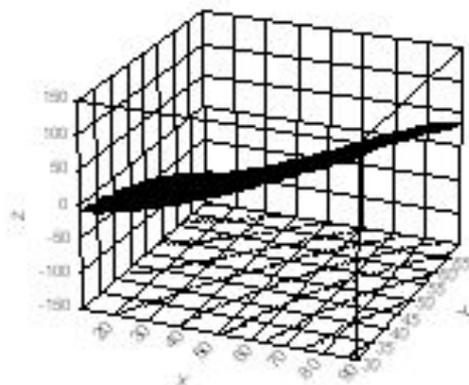
$$z = 0.029836033 * x^2 - 0.00594349 * y^2$$



$$z = -0.0001358 * x^3 - 0.00023333 * y^3$$



$$z = 1.9656e-5 * x * y^2 - 7.5078e-5 * y * x^2 + 0.006076028 * x * y$$



$$Z = 0.029836033 * X^2 - 0.00594349 * Y^2 - 0.0001358 * X^3 - 0.00023333 * Y^3$$

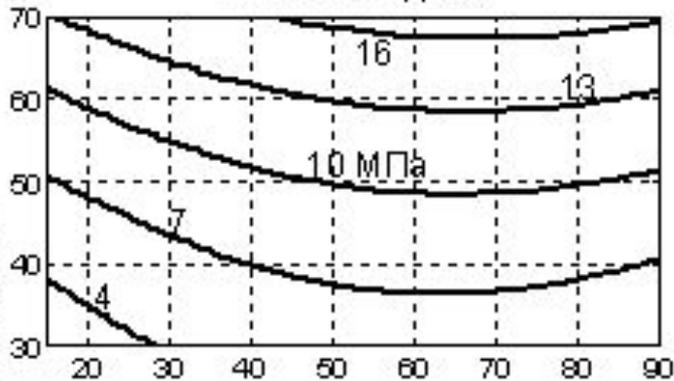
Фазовый анализ

модели третьего порядка

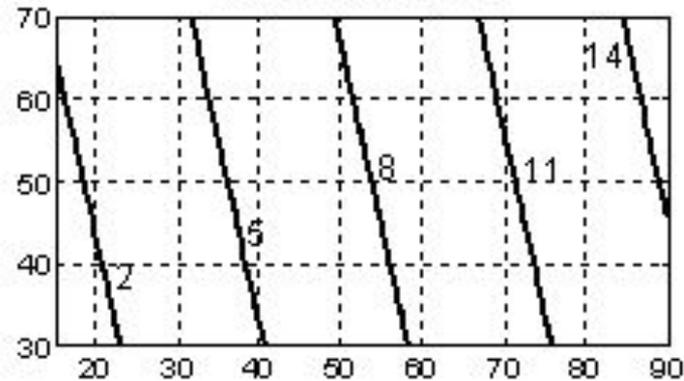
ФАЗОВЫЙ АНАЛИЗ

$$y = b_0 + b_1 X_1 + b_2 X_2 + b_{11} X_1^2 + b_{22} X_2^2 + b_{12} X_1 X_2$$

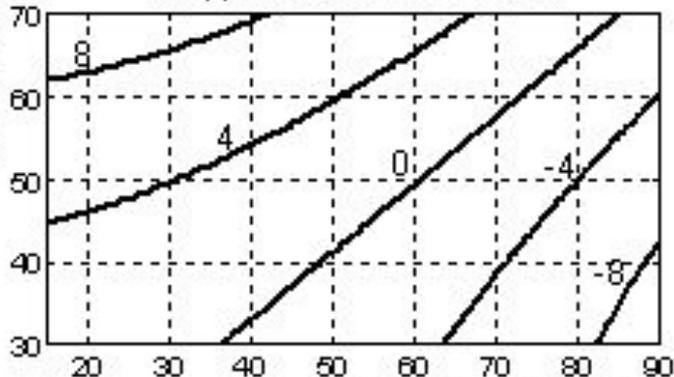
ПОЛНАЯ МОДЕЛЬ



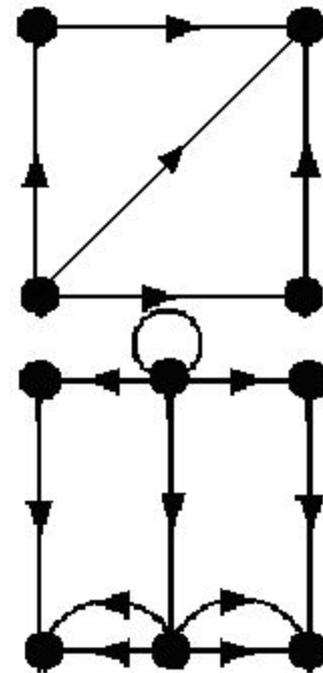
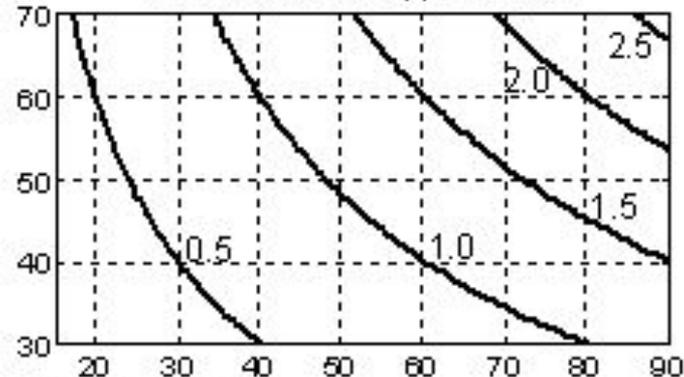
ЛИНЕЙНАЯ ЧАСТЬ



КВАДРАТИЧНЫЕ ЭФФЕКТЫ

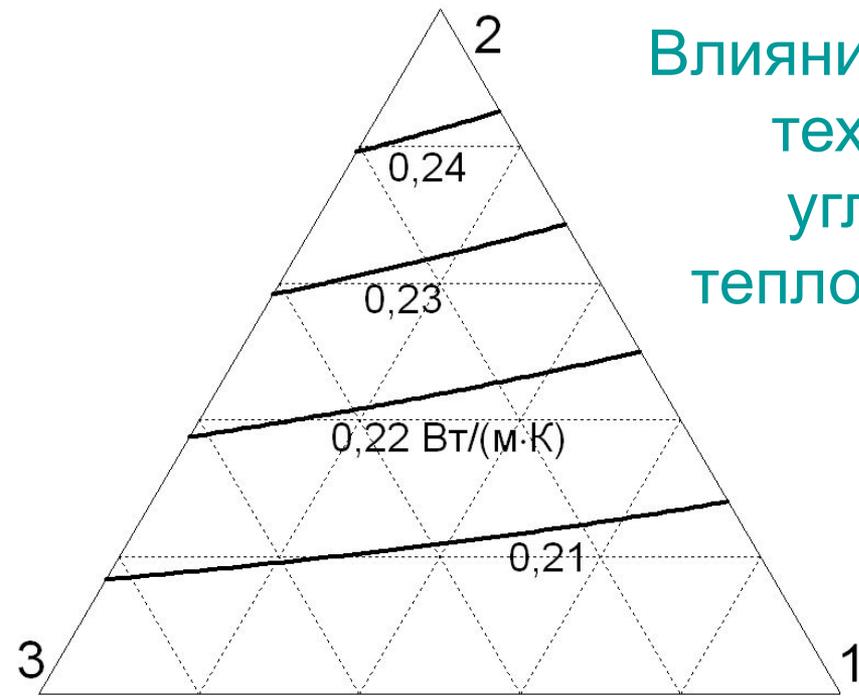


ЭФФЕКТ ВЗАИМОДЕЙСТВИЯ

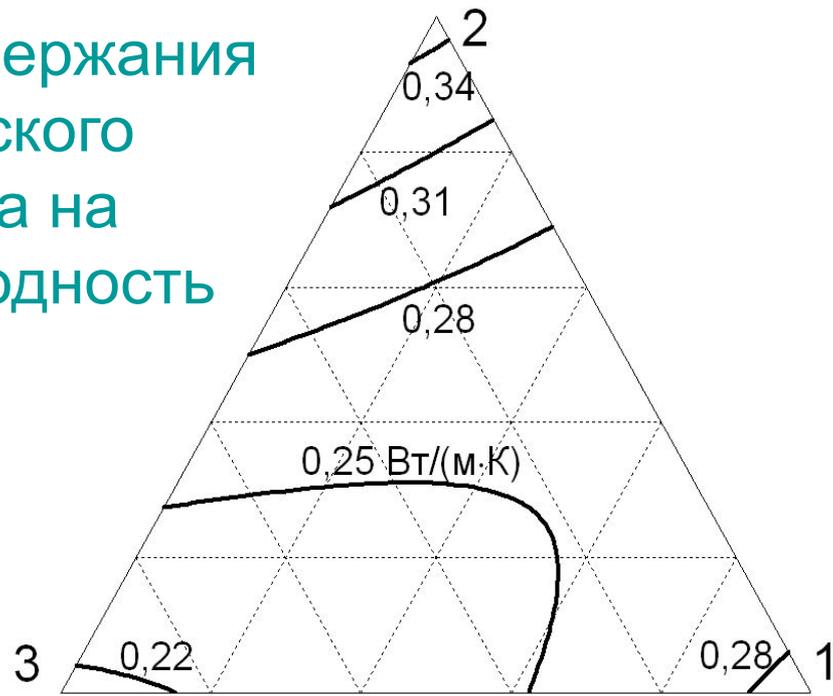


ПРОДОЛЖИТЕЛЬНОСТЬ В УЛКАНИЗАЦИИ, мин

Влияние содержания технического углерода на теплопроводность



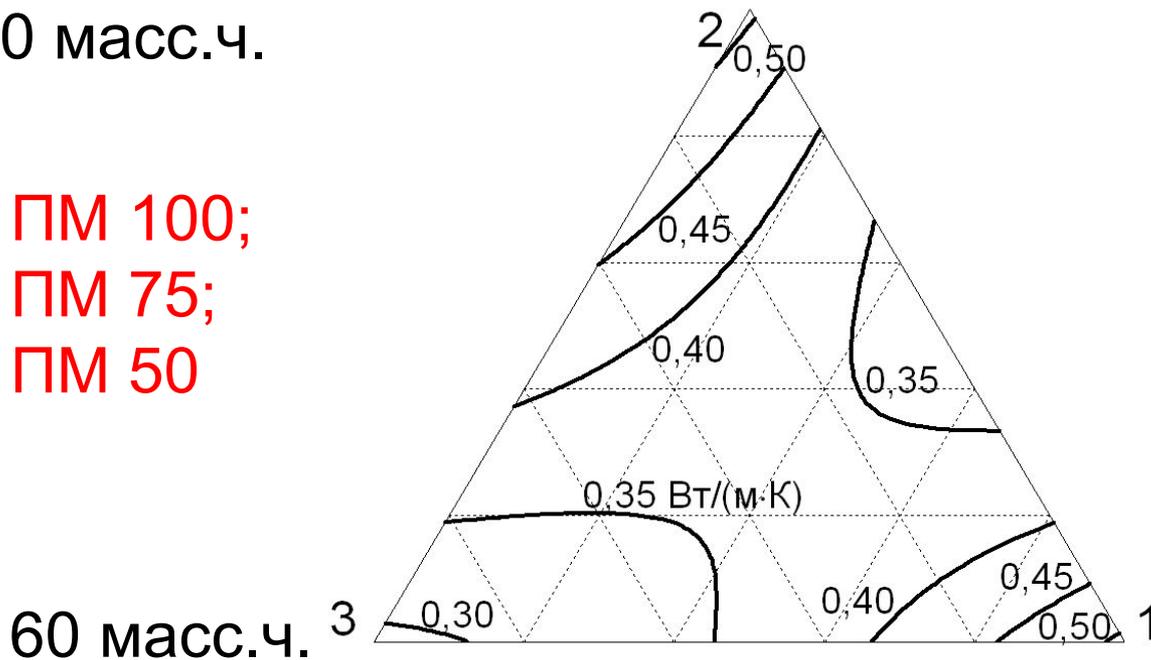
10 масс.ч.



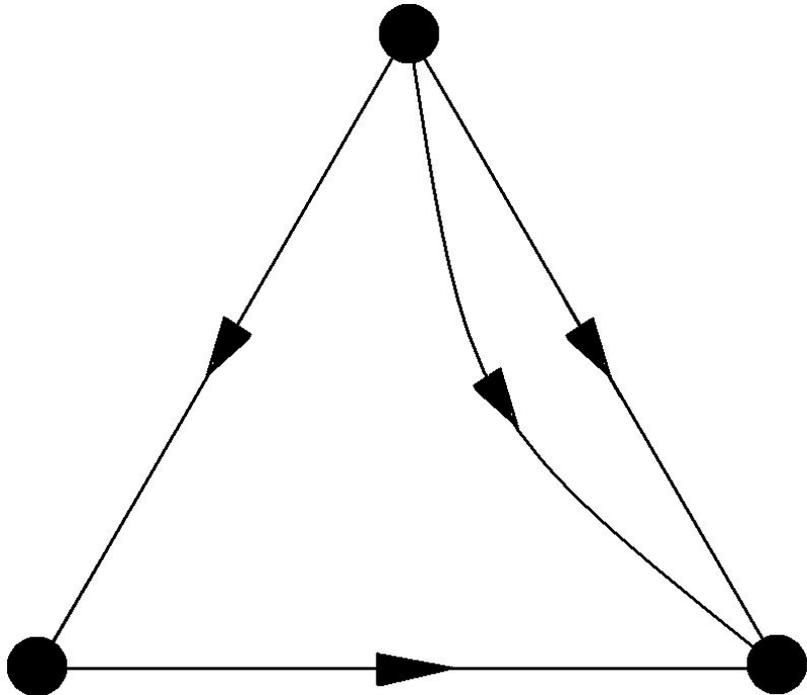
30 масс.ч.

1 – ПМ 100;
2 – ПМ 75;
3 – ПМ 50

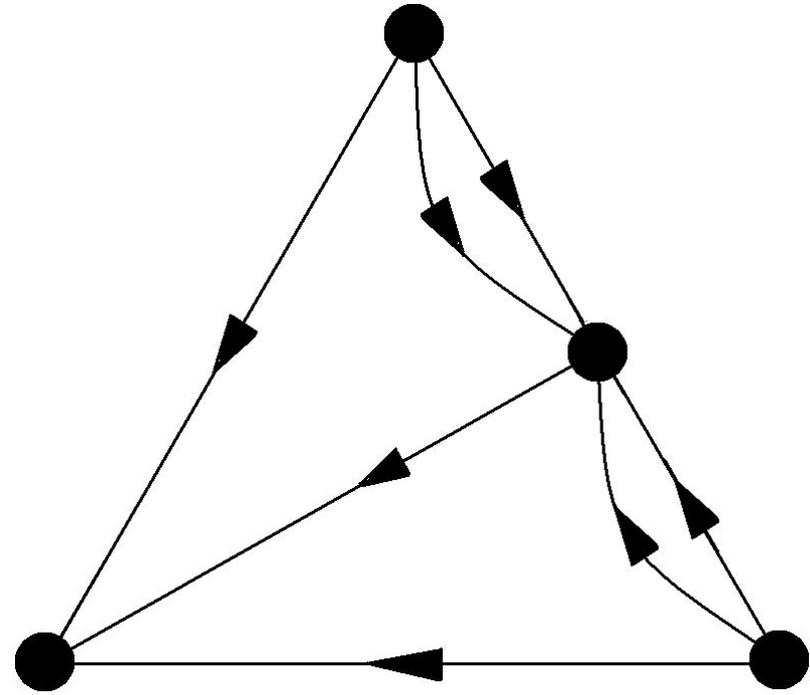
НК + СКИ-3



60 масс.ч.

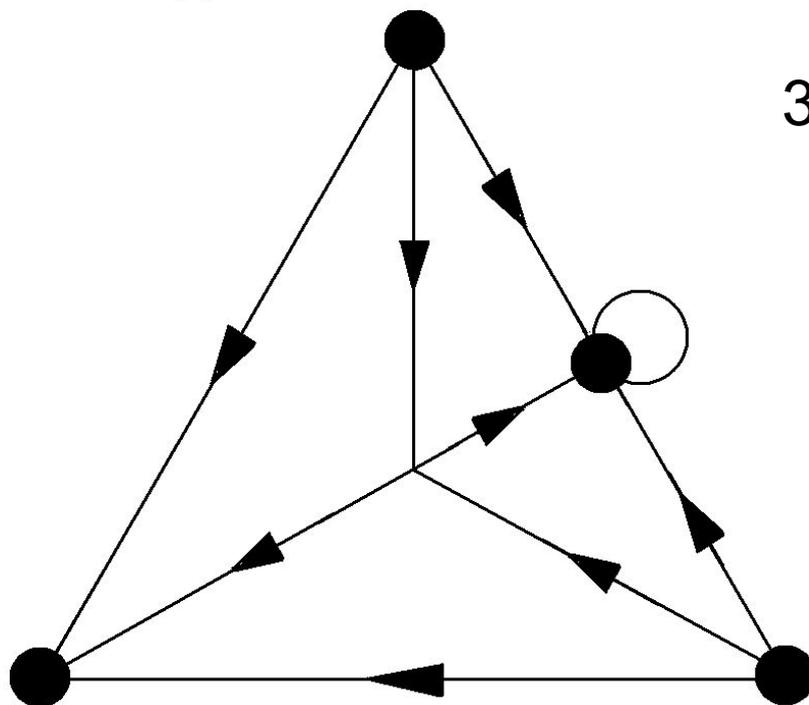


10 масс.ч.

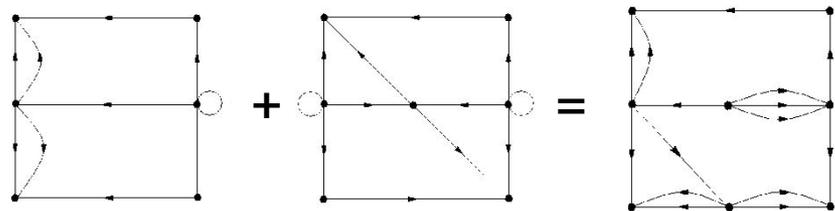
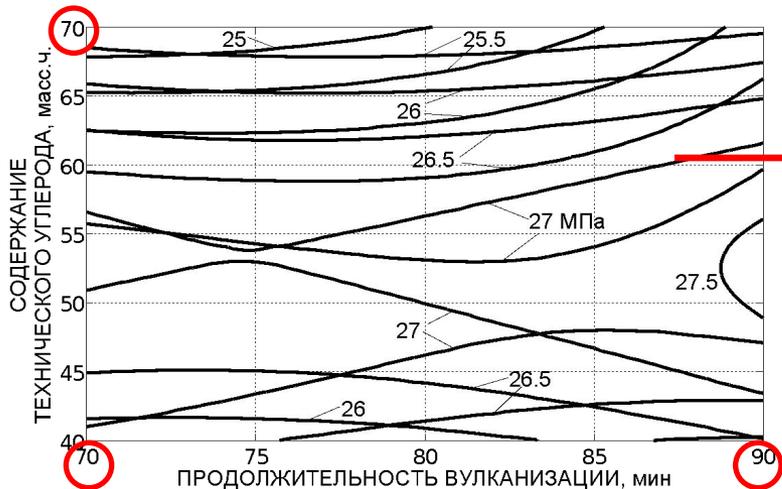
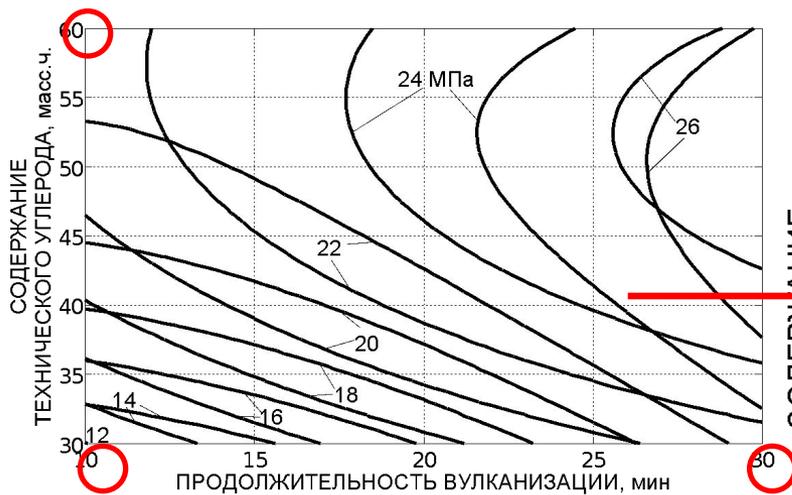


30 масс.ч.

60 масс.ч.



Прогнозирование поверхности отклика



Влияние растворителя на прочность связи (ткань-ткань)

