Сравнение методов Якоби и Гаусса-Зейделя для решения СЛАУ

Вариант 4

## Исходная матрица:

20 1 1 1 1 1 1 1 1 1 161

1 20 1 1 1 1 1 1 1 1 180

1 1 20 1 1 1 1 1 1 1 199

1 1 1 20 1 1 1 1 1 1 218

1 1 1 1 20 1 1 1 1 1 237

1 1 1 1 1 20 1 1 1 1 256

1 1 1 1 1 1 20 1 1 1 275

1 1 1 1 1 1 1 20 1 1 294

1 1 1 1 1 1 1 1 20 1 313

1 1 1 1 1 1 1 1 1 20 332

## Итерации при методе Якоби:

K = 1; X: 8,05; 9; 9,95; 10,9; 11,85; 12,8; 13,75; 14,7; 15,65; 16,6;

||X(1)-X(0)|| = 8,05

K = 2; X: 2,29; 3,2875; 4,285; 5,2825; 6,28; 7,2775; 8,275; 9,2725; 10,27; 11,2675;

||X(2)-X(1)|| = 5,76

K = 3; X: 4,77513; 5,775; 6,77487; 7,77475; 8,77462; 9,7745; 10,77437; 11,77425; 12,77412; 13,774;

||X(3)-X(2)|| = 2,48512

K = 4; X: 3,65148; 4,65147; 5,65146; 6,65146; 7,65145; 8,65144; 9,65144; 10,65143; 11,65143; 12,65142;

||X(4)-X(3)|| = 1,12365

K = 5; X: 4,15685; 5,15685; 6,15685; 7,15685; 8,15685; 9,15685; 10,15685; 11,15685; 12,15685; 13,15685;

||X(5)-X(4)|| = 0,50538

K = 6; X: 3,92942; 4,92942; 5,92942; 6,92942; 7,92942; 8,92942; 9,92942; 10,92942; 11,92942; 12,92942;

||X(6)-X(5)|| = 0,22743

K = 7; X: 4,03176; 5,03176; 6,03176; 7,03176; 8,03176; 9,03176; 10,03176; 11,03176; 12,03176; 13,03176;

||X(7)-X(6)|| = 0,10234

K = 8; X: 3,98571; 4,98571; 5,98571; 6,98571; 7,98571; 8,98571; 9,98571; 10,98571; 11,98571; 12,98571;

||X(8)-X(7)|| = 0,04605

K = 9; X: 4,00643; 5,00643; 6,00643; 7,00643; 8,00643; 9,00643; 10,00643; 11,00643; 12,00643; 13,00643;

||X(9)-X(8)|| = 0,02072

K = 10; X: 3,99711; 4,99711; 5,99711; 6,99711; 7,99711; 8,99711; 9,99711; 10,99711; 11,99711; 12,99711;

||X(10)-X(9)|| = 0,00933

K = 11; X: 4,0013; 5,0013; 6,0013; 7,0013; 8,0013; 9,0013; 10,0013; 11,0013; 12,0013; 13,0013;

||X(11)-X(10)|| = 0,0042

K = 12; X: 3,99941; 4,99941; 5,99941; 6,99941; 7,99941; 8,99941; 9,99941; 10,99941; 11,99941; 12,99941;

||X(12)-X(11)|| = 0,00189

K = 13; X: 4,00026; 5,00026; 6,00026; 7,00026; 8,00026; 9,00026; 10,00026; 11,00026; 12,00026; 13,00026;

||X(13)-X(12)|| = 0,00085

K = 14; X: 3,99988; 4,99988; 5,99988; 6,99988; 7,99988; 8,99988; 9,99988; 10,99988; 11,99988; 12,99988;

||X(14)-X(13)|| = 0,00038

K = 15; X: 4,00005; 5,00005; 6,00005; 7,00005; 8,00005; 9,00005; 10,00005; 11,00005; 12,00005; 13,00005;

||X(15)-X(14)|| = 0,00017

K = 16; X: 3,99998; 4,99998; 5,99998; 6,99998; 7,99998; 8,99998; 9,99998; 10,99998; 11,99998; 12,99998;

||X(16)-X(15)|| = 0,00008

## Итерации при методе Гаусса-Зейделя:

K = 0; X: 8,05; 8,5975; 9,11763; 9,61174; 10,08116; 10,5271; 10,95074; 11,35321; 11,73555; 12,09877;

K = 1; X: 3,34633; 4,55889; 5,73683; 6,88057; 7,9906; 9,06743; 10,11159; 11,12367; 12,10427; 13,05399;

||X(1)-X(0)|| = 3,34633

K = 2; X: 4,01861; 4,99562; 5,98268; 6,97758; 7,97823; 8,98269; 9,98913; 10,99586; 12,00128; 13,00392;

||X(2)-X(1)|| = 0,67228

K = 3; X: 4,00465; 5,0042; 6,00312; 7,00185; 8,00067; 8,99977; 9,99923; 10,99907; 11,99918; 12,99941;

||X(3)-X(2)|| = 0,01396

K = 4; X: 3,99968; 4,9999; 6,00006; 7,00015; 8,00018; 9,00016; 10,00011; 11,00006; 12,00001; 12,99998;

||X(4)-X(3)|| = 0,00498

K = 5; X: 3,99997; 4,99997; 5,99997; 6,99998; 7,99999; 9; 10; 11,00001; 12,00001; 13,00001;

||X(5)-X(4)|| = 0,00029

K = 6; X: 4; 5; 6; 7; 8; 9; 10; 11; 12; 13;

||X(6)-X(5)|| = 0,00003

Очевидно, что скорость сходимости метода Гаусса-Зейделя выше: значение с точностью 0,0001 получено за 6 итераций против 16 у Якоби.