Сравнение методов Якоби и Гаусса-Зейделя для решения СЛАУ

Вариант 4

## Исходная матрица:

20 1 1 1 1 1 1 1 1 1 142

1 20 1 1 1 1 1 1 1 1 161

1 1 20 1 1 1 1 1 1 1 180

1 1 1 20 1 1 1 1 1 1 199

1 1 1 1 20 1 1 1 1 1 218

1 1 1 1 1 20 1 1 1 1 237

1 1 1 1 1 1 20 1 1 1 256

1 1 1 1 1 1 1 20 1 1 275

1 1 1 1 1 1 1 1 20 1 294

1 1 1 1 1 1 1 1 1 20 313

## Итерации при методе Якоби:

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

||X(1)-X(0)|| = 7,1

K = 2; X: 1,7675; 2,765; 3,7625; 4,76; 5,7575; 6,755; 7,7525; 8,75; 9,7475; 10,745;

||X(2)-X(1)|| = 5,3325

K = 3; X: 4,06025; 5,06013; 6,06; 7,05987; 8,05975; 9,05963; 10,0595; 11,05938; 12,05925; 13,05913;

||X(3)-X(2)|| = 2,29275

K = 4; X: 3,02317; 4,02316; 5,02316; 6,02315; 7,02314; 8,02314; 9,02313; 10,02312; 11,02312; 12,02311;

||X(4)-X(3)|| = 1,03708

K = 5; X: 3,48959; 4,48959; 5,48959; 6,48959; 7,48959; 8,48959; 9,48959; 10,48959; 11,48959; 12,48959;

||X(5)-X(4)|| = 0,46642

K = 6; X: 3,27969; 4,27969; 5,27969; 6,27969; 7,27969; 8,27969; 9,27969; 10,27969; 11,27969; 12,27969;

||X(6)-X(5)|| = 0,2099

K = 7; X: 3,37414; 4,37414; 5,37414; 6,37414; 7,37414; 8,37414; 9,37414; 10,37414; 11,37414; 12,37414;

||X(7)-X(6)|| = 0,09446

K = 8; X: 3,33164; 4,33164; 5,33164; 6,33164; 7,33164; 8,33164; 9,33164; 10,33164; 11,33164; 12,33164;

||X(8)-X(7)|| = 0,0425

K = 9; X: 3,35076; 4,35076; 5,35076; 6,35076; 7,35076; 8,35076; 9,35076; 10,35076; 11,35076; 12,35076;

||X(9)-X(8)|| = 0,01913

K = 10; X: 3,34216; 4,34216; 5,34216; 6,34216; 7,34216; 8,34216; 9,34216; 10,34216; 11,34216; 12,34216;

||X(10)-X(9)|| = 0,00861

K = 11; X: 3,34603; 4,34603; 5,34603; 6,34603; 7,34603; 8,34603; 9,34603; 10,34603; 11,34603; 12,34603;

||X(11)-X(10)|| = 0,00387

K = 12; X: 3,34429; 4,34429; 5,34429; 6,34429; 7,34429; 8,34429; 9,34429; 10,34429; 11,34429; 12,34429;

||X(12)-X(11)|| = 0,00174

K = 13; X: 3,34507; 4,34507; 5,34507; 6,34507; 7,34507; 8,34507; 9,34507; 10,34507; 11,34507; 12,34507;

||X(13)-X(12)|| = 0,00078

K = 14; X: 3,34472; 4,34472; 5,34472; 6,34472; 7,34472; 8,34472; 9,34472; 10,34472; 11,34472; 12,34472;

||X(14)-X(13)|| = 0,00035

K = 15; X: 3,34488; 4,34488; 5,34488; 6,34488; 7,34488; 8,34488; 9,34488; 10,34488; 11,34488; 12,34488;

||X(15)-X(14)|| = 0,00016

K = 16; X: 3,34481; 4,34481; 5,34481; 6,34481; 7,34481; 8,34481; 9,34481; 10,34481; 11,34481; 12,34481;

||X(16)-X(15)|| = 0,00007

## Итерации при методе Зейделя-Гаусса:

K = 0; X: 7,1; 7,695; 8,26025; 8,79724; 9,30738; 9,79201; 10,25241; 10,68979; 11,1053; 11,50003;

K = 1; X: 2,73003; 3,92828; 5,09488; 6,23; 7,33386; 8,40677; 9,44905; 10,46109; 11,4433; 12,39614;

||X(1)-X(0)|| = 2,73003

K = 2; X: 3,36283; 4,3411; 5,32879; 6,32385; 7,32435; 8,32847; 9,3345; 10,34083; 11,34596; 12,34846;

||X(2)-X(1)|| = 0,6328

K = 3; X: 3,34918; 4,34878; 5,34778; 6,34658; 7,34547; 8,34462; 9,34412; 10,34395; 11,34405; 12,34427;

||X(3)-X(2)|| = 0,01365

K = 4; X: 3,34452; 4,34473; 5,34488; 6,34497; 7,34499; 8,34498; 9,34493; 10,34488; 11,34484; 12,34481;

||X(4)-X(3)|| = 0,00466

K = 5; X: 3,3448; 4,3448; 5,3448; 6,34481; 7,34482; 8,34483; 9,34483; 10,34483; 11,34483; 12,34483;

||X(5)-X(4)|| = 0,00028

K = 6; X: 3,34483; 4,34483; 5,34483; 6,34483; 7,34483; 8,34483; 9,34483; 10,34483; 11,34483; 12,34483;

||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.