

Dirichlet Boundary

$$-u''(x) + r(x)u(x) = f(x), \quad 0 \leq x \leq 1 \quad (1)$$

$$u(0) = \alpha, u(1) = \beta. \quad (2)$$

- At each node x_i , using the centered difference approximation

$$u''(x_i) = \frac{u(x_i + 1) - 2u(x_i) + u(x_{i-1}))}{h^2}$$

- Substituting into the BVP (3) yields

$$-\frac{1}{h^2}(u_{i-1} - 2u_i + u_{i+1}) + r(x_i)u_i = f(x_i), \quad i = 1, \dots, n-1$$

2.0489	-1.0000	0	0
-1.0000	2.0597	-1.0000	0
0	-1.0000	2.0729	-1.0000
0	0	-1.0000	2.0890

Mixed Boundary conditions

$$-u''(x) + r(x)u(x) = f(x), \quad 0 \leq x \leq 1 \quad (3)$$

$$u(0) = \alpha, u'(1) = \beta. \quad (4)$$

- At each node x_i , using the centered difference approximation

$$u''(x_i) = \frac{u(x_i + 1) - 2u(x_i) + u(x_{i-1}))}{h^2}$$

2.0489	-1.0000	0	0	0
-1.0000	2.0597	-1.0000	0	0
0	-1.0000	2.0729	-1.0000	0
0	0	-1.0000	2.0890	-1.0000
0	0	0	-2.0000	2.1087

Comparison

```
//dirichlet b.c matrix (n=5)
```

```
2.0489    -1.0000         0         0
-1.0000    2.0597    -1.0000         0
         0    -1.0000    2.0729    -1.0000
         0         0    -1.0000    2.0890
```

```
=====
```

```
//Mixed b.c matrix (n=5)
```

```
2.0489    -1.0000         0         0         0
-1.0000    2.0597    -1.0000         0         0
         0    -1.0000    2.0729    -1.0000         0
         0         0    -1.0000    2.0890    -1.0000
         0         0         0    -2.0000    2.1087
```