

Case Studies HW4 — Subgrid Methods

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1 Question 4.3

```
drozdtux@Copernicus $ ./q3_part1
```

```
l = 2
```

```
Consecutive residual norm ||r0|| = 1261.797981, ||r0|| / len(r0) = 0.077014
Consecutive residual norm ||r1|| = 627.917032, ||r1|| / len(r1) = 0.153300
total no. of coarse level solves = 4817
time taken = 12.975708
final residual ||r|| = 1264.023227, ||r|| / len(r) = 0.077150
```

```
l = 3
```

```
Consecutive residual norm ||r0|| = 1261.797981, ||r0|| / len(r0) = 0.077014
Consecutive residual norm ||r1|| = 627.917032, ||r1|| / len(r1) = 0.153300
Consecutive residual norm ||r2|| = 308.166766, ||r2|| / len(r2) = 0.300944
total no. of coarse level solves = 1231
time taken = 4.249110
final residual ||r|| = 1265.371902, ||r|| / len(r) = 0.077232
```

```
l = 4
```

```
Consecutive residual norm ||r0|| = 1261.797981, ||r0|| / len(r0) = 0.077014
Consecutive residual norm ||r1|| = 621.561344, ||r1|| / len(r1) = 0.151748
Consecutive residual norm ||r2|| = 1947.368807, ||r2|| / len(r2) = 1.901727
Consecutive residual norm ||r3|| = 860.816263, ||r3|| / len(r3) = 3.362564
total no. of coarse level solves = 352
time taken = 4.061526
final residual ||r|| = 1295.769703, ||r|| / len(r) = 0.079088
```

```
l = 5
```

```
Consecutive residual norm ||r0|| = 1261.797981, ||r0|| / len(r0) = 0.077014
Consecutive residual norm ||r1|| = 621.561344, ||r1|| / len(r1) = 0.151748
Consecutive residual norm ||r2|| = 1947.368807, ||r2|| / len(r2) = 1.901727
Consecutive residual norm ||r3|| = 860.816263, ||r3|| / len(r3) = 3.362564
Consecutive residual norm ||r4|| = 294.509158, ||r4|| / len(r4) = 4.601706
total no. of coarse level solves = 98
time taken = 4.136292
final residual ||r|| = 1477.914647, ||r|| / len(r) = 0.090205
```

```
l = 6
```

```
Consecutive residual norm ||r0|| = 1261.797981, ||r0|| / len(r0) = 0.077014
Consecutive residual norm ||r1|| = 621.293558, ||r1|| / len(r1) = 0.151683
Consecutive residual norm ||r2|| = 1940.907484, ||r2|| / len(r2) = 1.895417
Consecutive residual norm ||r3|| = 858.233555, ||r3|| / len(r3) = 3.352475
Consecutive residual norm ||r4|| = 294.342408, ||r4|| / len(r4) = 4.599100
Consecutive residual norm ||r5|| = 50.902738, ||r5|| / len(r5) = 3.181421
total no. of coarse level solves = 27
```

```
time taken = 4.131410
final residual ||r|| = 1027.242928, ||r||/ len(r) = 0.062698
```

```
drozdtux@Copernicus $ ./q3_part2
```

```
N = 16
Consecutive residual norm ||r0|| = 146.724465, ||r0|| / len(r0) = 0.573142
Consecutive residual norm ||r1|| = 56.014507, ||r1|| / len(r1) = 0.875227
total no. of coarse level solves = 91
time taken = 0.001187
final residual ||r|| = 154.927827, ||r||/ len(r) = 0.605187
```

```
N = 32
Consecutive residual norm ||r0|| = 309.944138, ||r0|| / len(r0) = 0.302680
Consecutive residual norm ||r1|| = 144.186548, ||r1|| / len(r1) = 0.563229
total no. of coarse level solves = 327
time taken = 0.017223
final residual ||r|| = 316.037673, ||r||/ len(r) = 0.308631
```

```
N = 64
Consecutive residual norm ||r0|| = 628.656150, ||r0|| / len(r0) = 0.153481
Consecutive residual norm ||r1|| = 308.524198, ||r1|| / len(r1) = 0.301293
total no. of coarse level solves = 1231
time taken = 0.381094
final residual ||r|| = 632.606106, ||r||/ len(r) = 0.154445
```

```
N = 128
Consecutive residual norm ||r0|| = 1261.797981, ||r0|| / len(r0) = 0.077014
Consecutive residual norm ||r1|| = 627.917032, ||r1|| / len(r1) = 0.153300
total no. of coarse level solves = 4817
time taken = 12.926409
final residual ||r|| = 1264.023227, ||r||/ len(r) = 0.077150
```