Physics 562 - Computational Physics

Midterm 2

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Abstract

This paper examines two different questions.

1 Problem 1

The first problem is an interesting one.

2 The Fortran95 code

Numtype is the same for problems 1 and 2.

Listing 1: Module `NumType`

```fortran
module NumType

    save
    integer, parameter ::   dp = kind(1.d0)
    real(dp), parameter ::  pi = 4*atan(1._dp)
    complex(dp), parameter ::   iic = (0._dp,1._dp),&
                                one = (1._dp,0._dp),&
                                zero = (0._dp,0._dp)
```

```
10
11
12  end module NumType
```

<div align="center">Listing 2: q1.f95</div>

The main program is q1 and it begins with its own module.

<div align="center">Listing 3: q1.f95</div>

The code is run by typing ./q1. Various data sets are plotted to different files for easy graphing.

3   Problem 2

The second problem is challenging.

4   The Fortran95 code

<div align="center">Listing 4: q2.f95</div>

The main program is q2 and it begins with its own module.

<div align="center">Listing 5: q2.f95</div>

The code is run by typing ./q2. Various data sets are plotted to different files for easy graphing.

5   Results

Both the results are talked about here.

Figure 1: first image

Figure 2: second image

6 Summary and conclusions

Both problems have interesting results

References

[1] M. Metcalf, J. Reid and M. Cohen, *Fortran 95/2003 explained.* Oxford University Press, 2004.