Exercise 3

–Addendum–

Installing and using R Shiny

Installing `shiny`

In order to make sure everything works correctly, be aware that we have tested for `R 3.1`. Upon opening R, type the following:

```
> version
```

R will then output something similar to this:

```
                _
platform        x86_64-apple-darwin13.1.0
arch            x86_64
os              darwin13.1.0
system          x86_64, darwin13.1.0
status

major           3
minor           1.0


year            2014
month           04
day             10
svn rev         65387
language        R

version.string R version 3.1.0 (2014-04-10)
nickname        Spring Dance
```

The important things to check for are the `version.string` or the `major` and `minor` release numbers. If they are incorrect, please try to update. Next, install the `shiny` library via:

```
> install.packages("shiny")
```

You will need to select a `CRAN` mirror. Choosing `0-Cloud`, `Germany (Berlin)`, `Germany (Bonn)`, or `Germany (Goettingen)` will all work. I would recommend against choosing a server in another country as download times may increase. If there are any errors (usually from unresolved dependencies), install the required packages first before re-attempting to install `shiny`. R will tell you which package it cannot find. A successful installation should look something like this:

```
The downloaded binary packages are in
/var/folders/g9/rnnpj68x1zx4ttywdy67gnpw0000gp/T//RtmpExWkgS/downloaded_packages
```

Bear in mind that the directory will not be identical! You can test if `shiny` was installed correctly by giving:

```
> library(shiny)
>
```

This loads the `shiny` library, which you will need to do any time you wish to run a `shiny` program. If there are no errors, `shiny` is installed correctly.

Starting the Rayleigh-Benard GUI

To begin, make sure you have all the relevant files. In R, navigate to the correct directory and give a `dir()`.

```
> setwd("/Users/Gierz/Documents/Uni/Doktor/Teaching/Dynamics2/Homework/")
> # Your directory will be different!
> dir()
 [1] "exercise3.pdf"              "exercise3.synctex.gz"
 [3] "exercise3.tex"              "ocean_rb_ridge.R"
 [5] "ocean_rb.R"                 "out"
 [7] "PageStructureFunctions.R"   "rayleigh-benard.R"
 [9] "rb_functions.R"             "rb_lbm.R"
[11] "rb_plot_functions.R"        "README_Shiny_ex3.blg"
[13] "README_Shiny_ex3.pdf"       "README_Shiny_ex3.synctex.gz"
[15] "README_Shiny_ex3.tex"       "server.R"
[17] "ui.R"
```

Compare your `dir()` command, and make sure you have all of the `.R` files. If everything is there, you can proceed with:

```
> library(shiny)
> runApp(".")

    Listening on http://127.0.0.1:3599
```

Using the GUI

`R` will launch a web browser. The second tab, *Simulation parameter*, allows you to change the Prandtl and Rayleigh number, and also tells you the effective viscosity and thermal diffusivity in lattice units. Set these as you wish and push *Run Simulation*. This **may** take some time, depending on your computer and how many background programs you have running. Once the simulation is completed, you will be able to set the *Plot Options*. You can select a variable from the drop down menu, check or uncheck to see velocity vectors, and select the time frame (time step) at the bottom. You can also save the plot using the button.

    <u>Notes on submission form of the exercises:</u> *Students may work together in groups, but each student is responsible for her/his own solutions. The answers to the questions shall be send to paul.gierz@awi.de.*