

Illini Baseball Ground Ball Scouting Report

Danny Thompson

2022-12-26

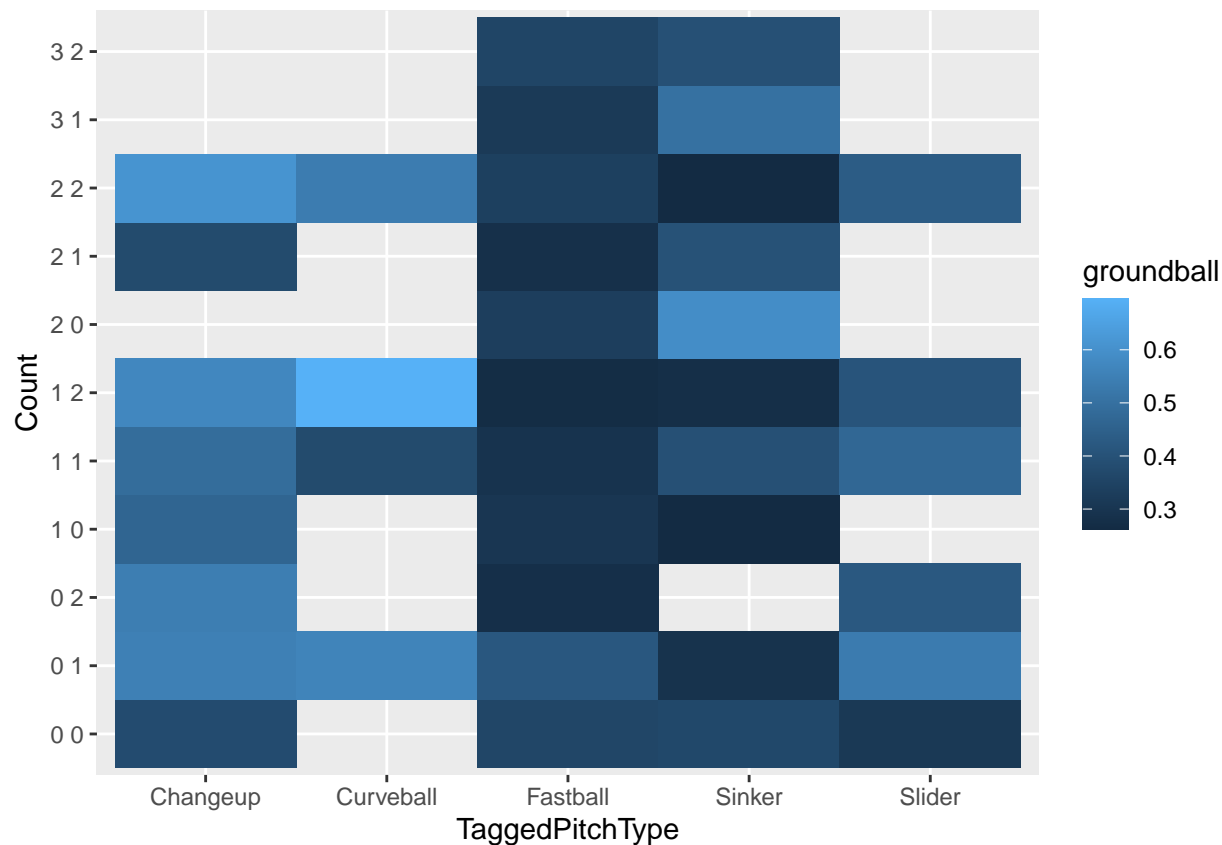
This is a scouting report of pitch data from Illini baseball games from 2018 to 2022 that determines patterns of batter launch angle and likelihood of hitting a ground ball. These data were tracked with Flightscope from 2019-2021 and Trackman in 2022. This analysis starts off with analyzing the best pitches to throw per count to roll a ground ball, then provides a strike zone heat map for ground balls, and finally analyzes fourteen additional parameters which account for pitcher handedness and pitch type to determine their best combinations of each parameter to maximize ground ball percentage.

```
## -- Attaching packages ----- tidyverse 1.3.2 --
## v ggplot2 3.3.6      v purrr  0.3.5
## v tibble  3.1.8      v dplyr  1.0.10
## v tidyr   1.2.1      v stringr 1.4.1
## v readr   2.1.3      v forcats 0.5.2
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()
## Loading required package: DBI
```

Ground Ball Percentage per Type of Pitch in Certain Counts

```
## 'summarise()' has grouped output by 'Count'. You can override using the
## '.groups' argument.
```

```
## # A tibble: 39 x 4
## # Groups:   Count [11]
##   Count TaggedPitchType    N groundball
##   <chr> <chr>          <int>    <dbl>
## 1 0 0 Changeup           45    0.378
## 2 0 0 Fastball          145    0.359
## 3 0 0 Sinker            63    0.365
## 4 0 0 Slider            32    0.312
## 5 0 1 Changeup           31    0.548
## 6 0 1 Curveball         25    0.56
## 7 0 1 Fastball           79    0.418
## 8 0 1 Sinker            24    0.292
## 9 0 1 Slider            30    0.533
## 10 0 2 Changeup          24    0.542
## # ... with 29 more rows
```



From the data, the best pitch to throw by count is

- 0-0 Changeup 37.78%
- 0-1 Curveball 56.00%
- 0-2 Changeup 54.17%
- 1-0 Changeup 46.15%
- 1-1 Changeup 48.78%
- 1-2 Curveball 69.56%
- 2-0 Sinker 58.82%
- 2-1 Sinker 40.00%
- 2-2 Changeup 60.87%
- 3-1 Sinker 50.00%
- 3-2 Sinker 39.39%

Ground Ball Percentage of Strike Zone by Pitcher Handedness

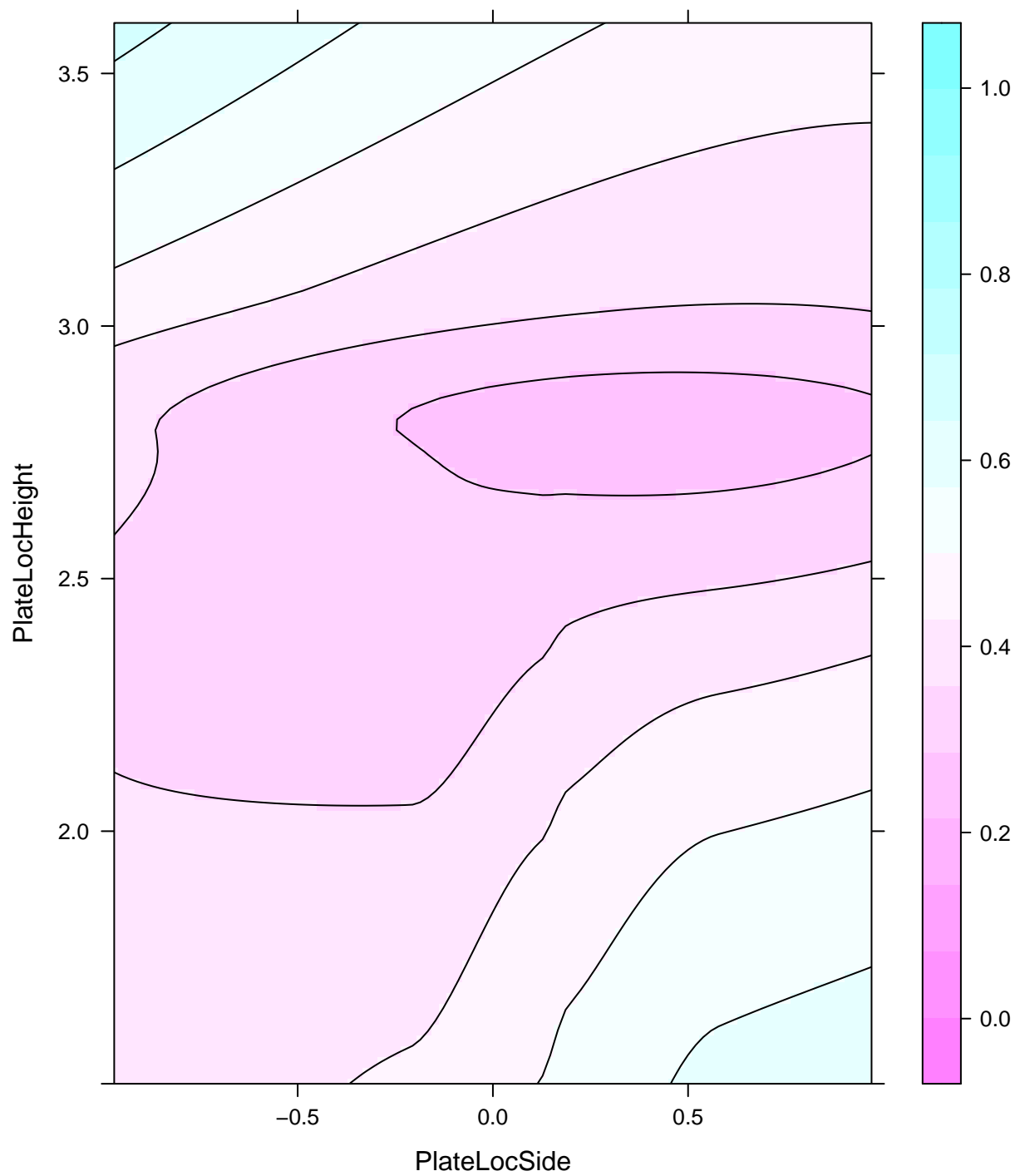
These are strike zone plots from the catcher's POV that determine where ground ball percentage is high and low based on location of the pitch. The color scheme for the rest of this plot is blue for high ground ball percentage, and pink for low ground ball percentage.

```
##
## Attaching package: 'latticeExtra'

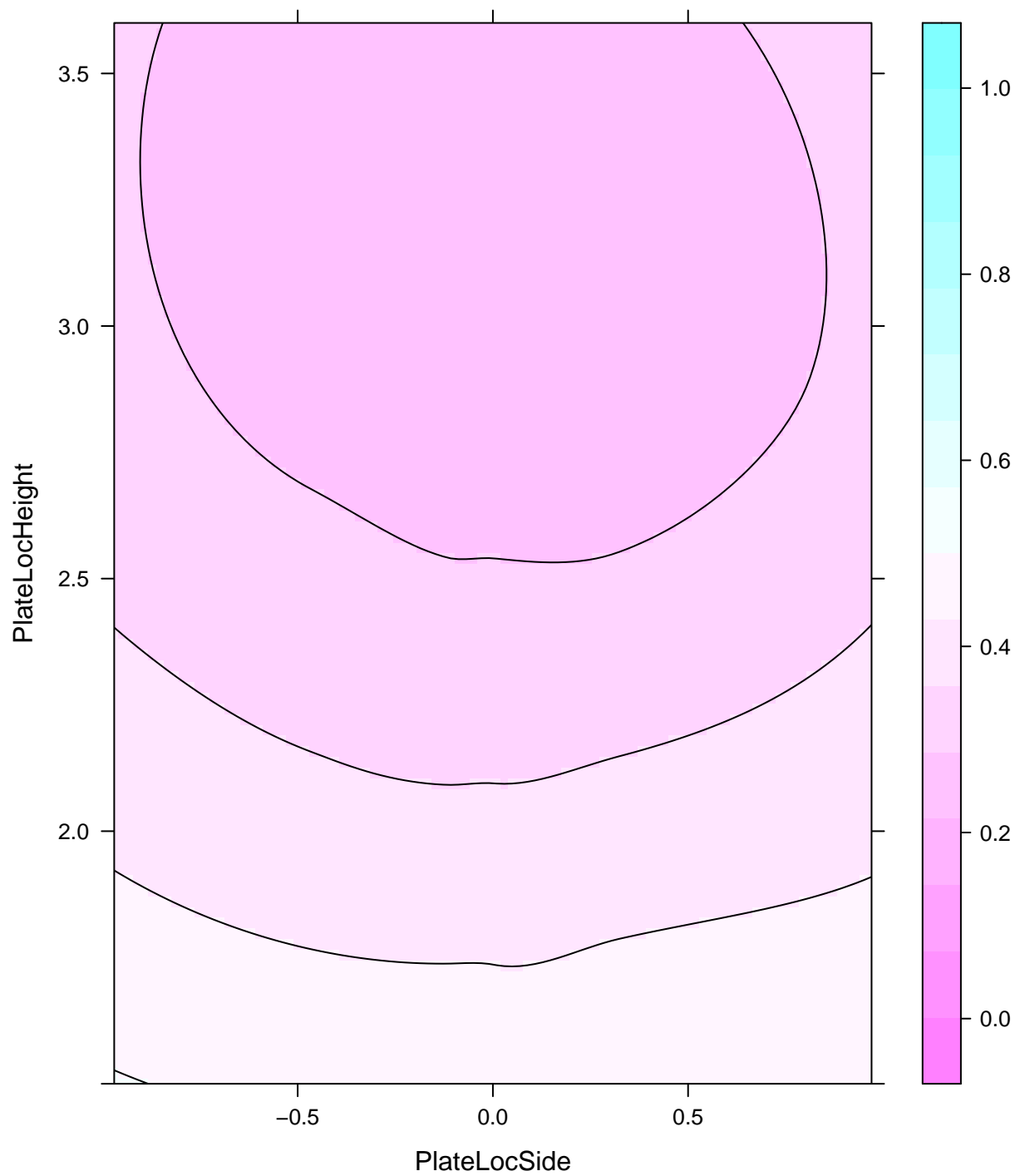
## The following object is masked from 'package:ggplot2':
```

```
##  
## layer
```

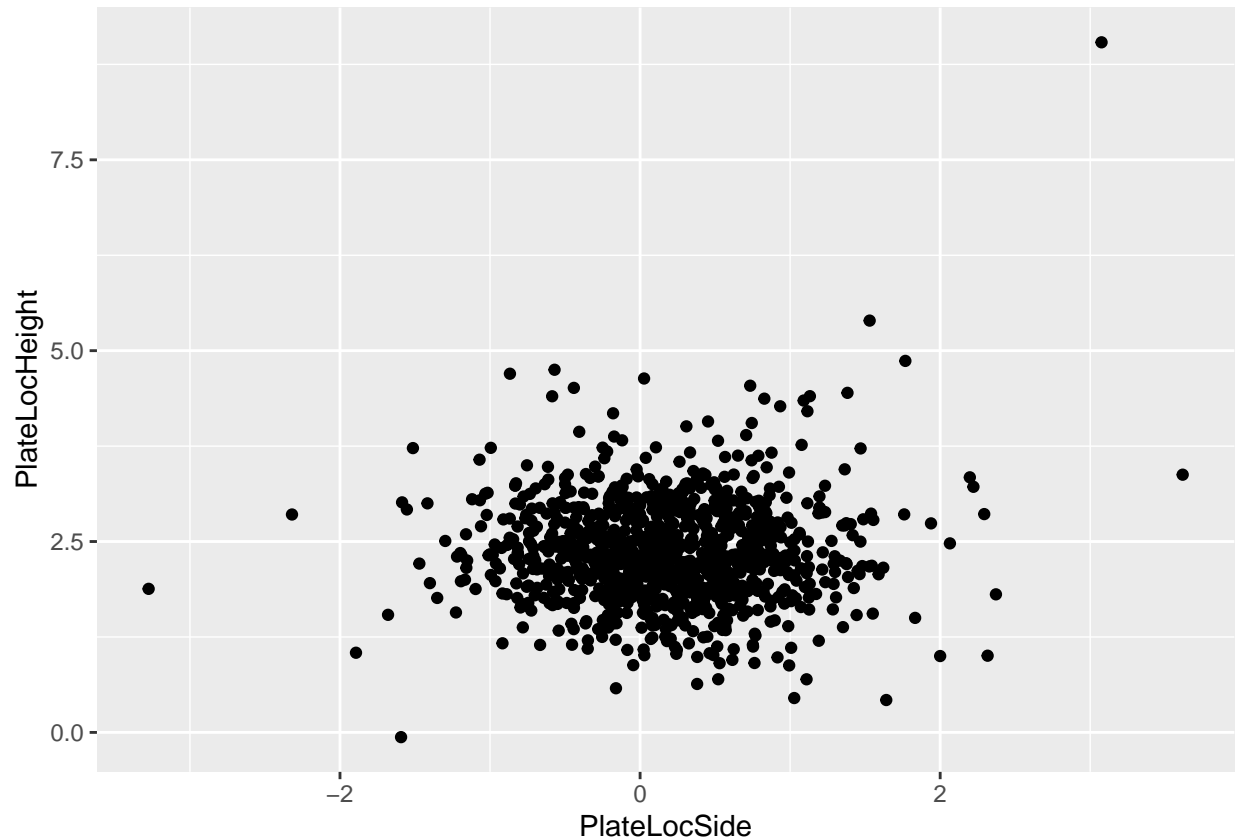
Ground Ball Percentage for Left Handed Batters



Ground Ball Percentage for Right Handed Batters



These two contour maps do oddly look dissimilar yet share a common theme that throwing down and inside generates the most amount of ground balls. For the left handed plot, having a higher ground ball percentage for up and away pitches is not only counter intuitive, it's backed up by only a small sample size of unpredictable outcomes of the pitch as proven by this plot:



Two dimensional desired targets for each type of pitch for both pitcher handedness

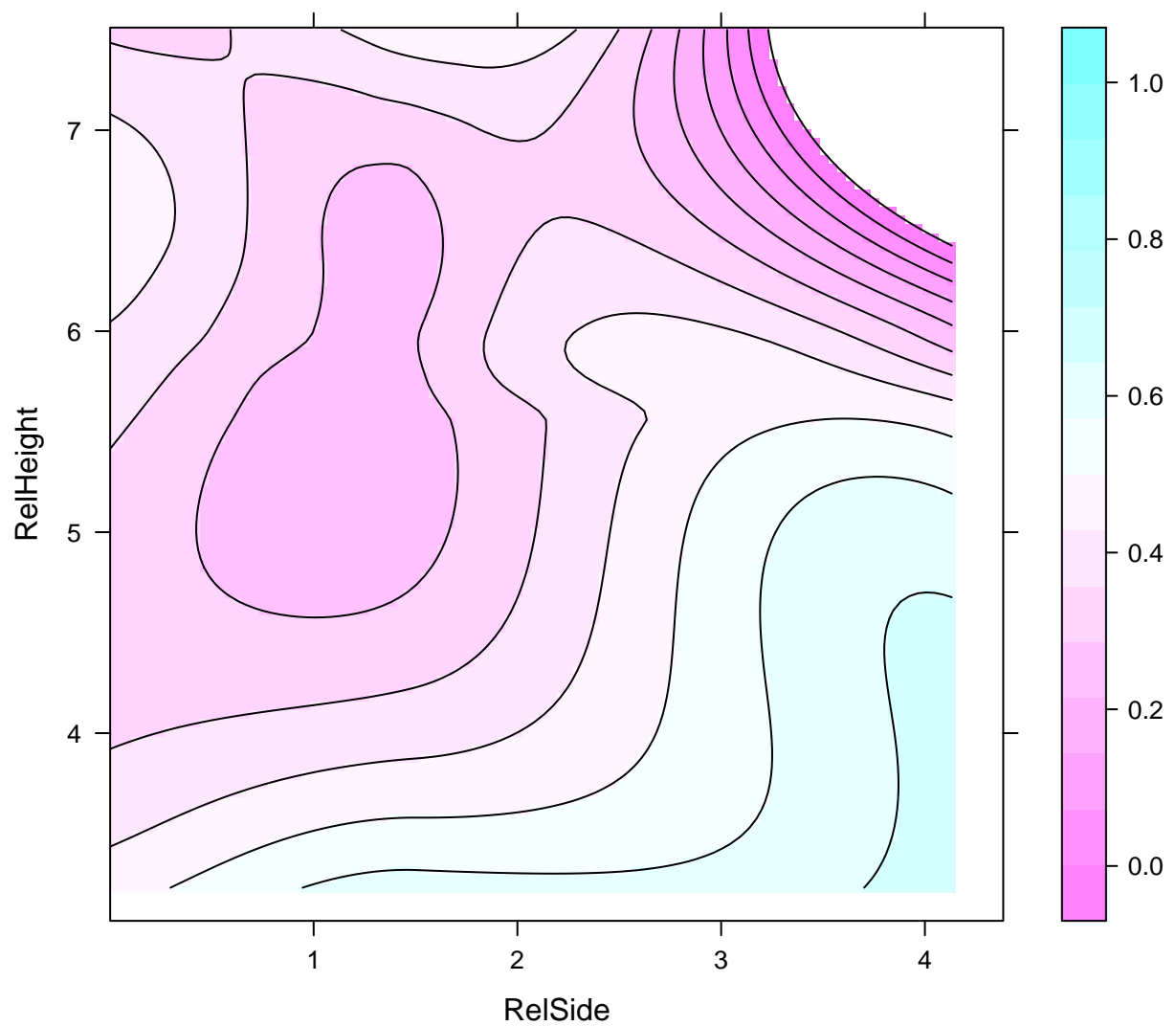
These are contour maps showing which combinations of data appropriately mixed produce the most and fewest amount of ground balls per pitch. These are to be taken with a grain of salt with the low sample size and high variation in nature, but they are useful for knowing what to stay away from. Goodhart's Law states that "when a measure becomes a target, it ceases to be a good measure" which is mostly true when striving for one measure. These maps combine for fourteen. Pitchers don't have any business striving for fourteen measures when on the mound, but these are good targets to test in off-season lab work if a pitcher struggles with rolling ground balls.

The strike zone contour maps were from the catcher's POV, however for the release coordinates, release angle, approximate angle, pfx and pfxz, and the break, these can be thought of as from the pitcher's POV.

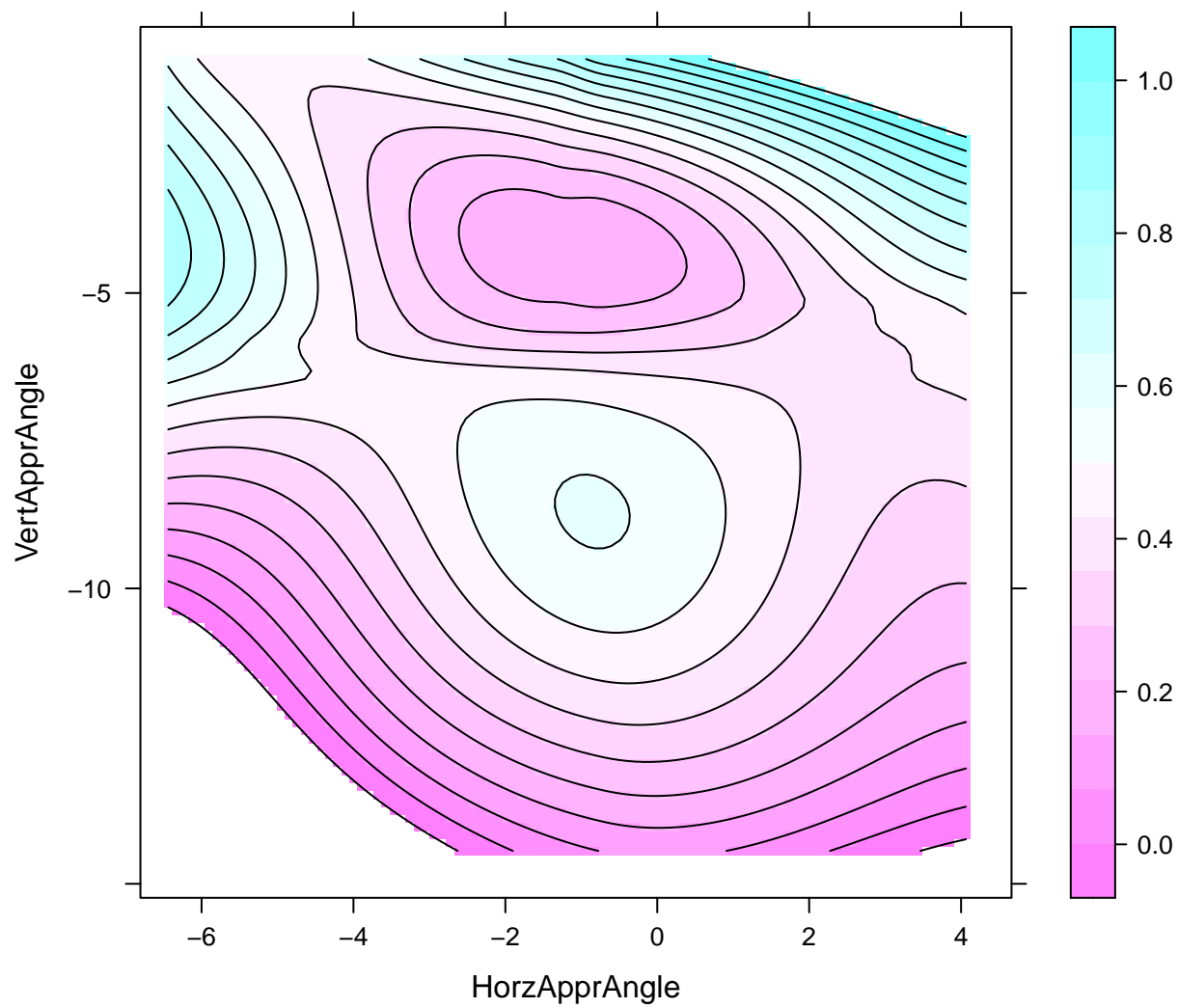
Right Handed Pitchers

Right Handed Fastball

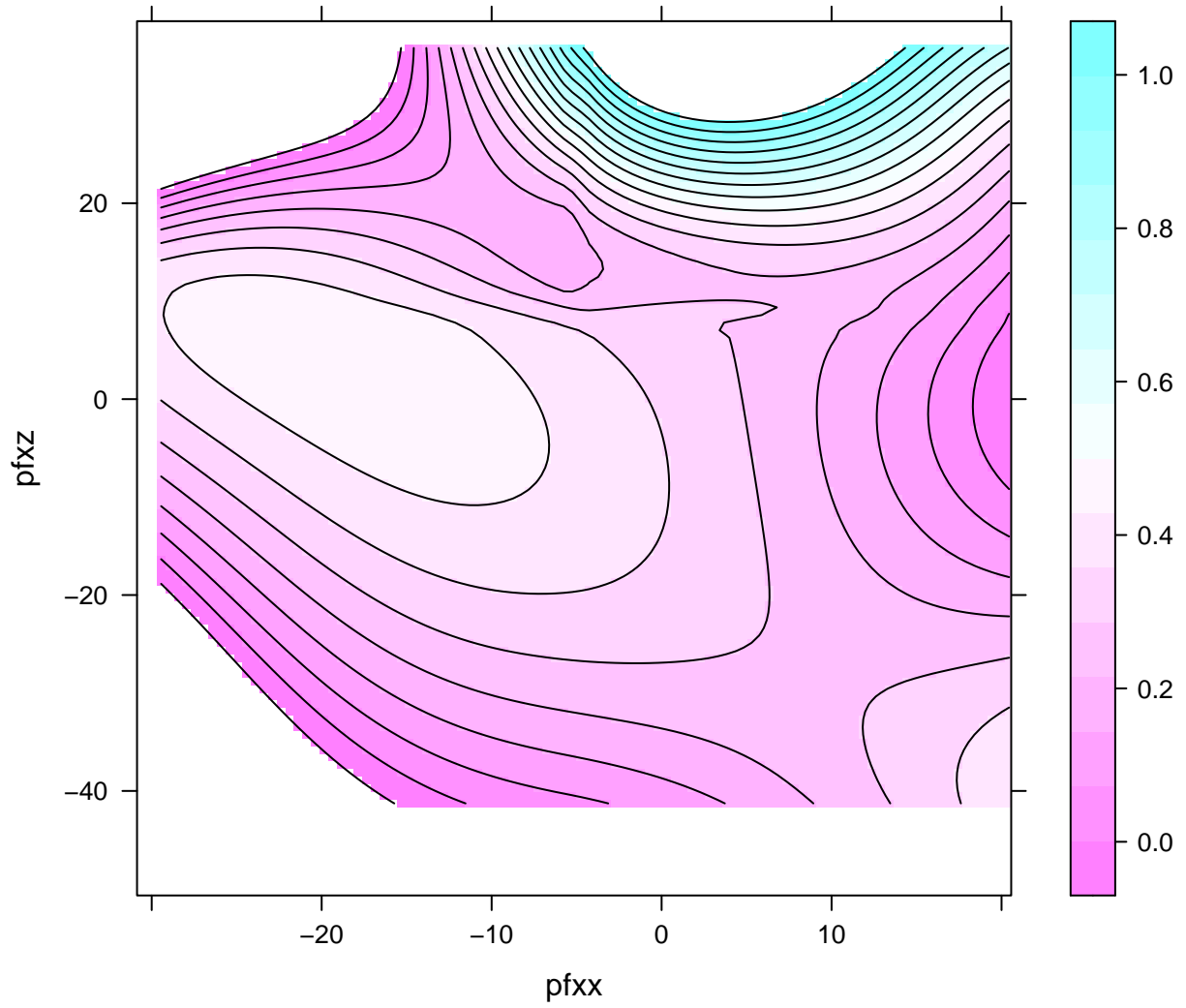
Ground Ball Sweet Spot for Righty Fastball Release Coordinates



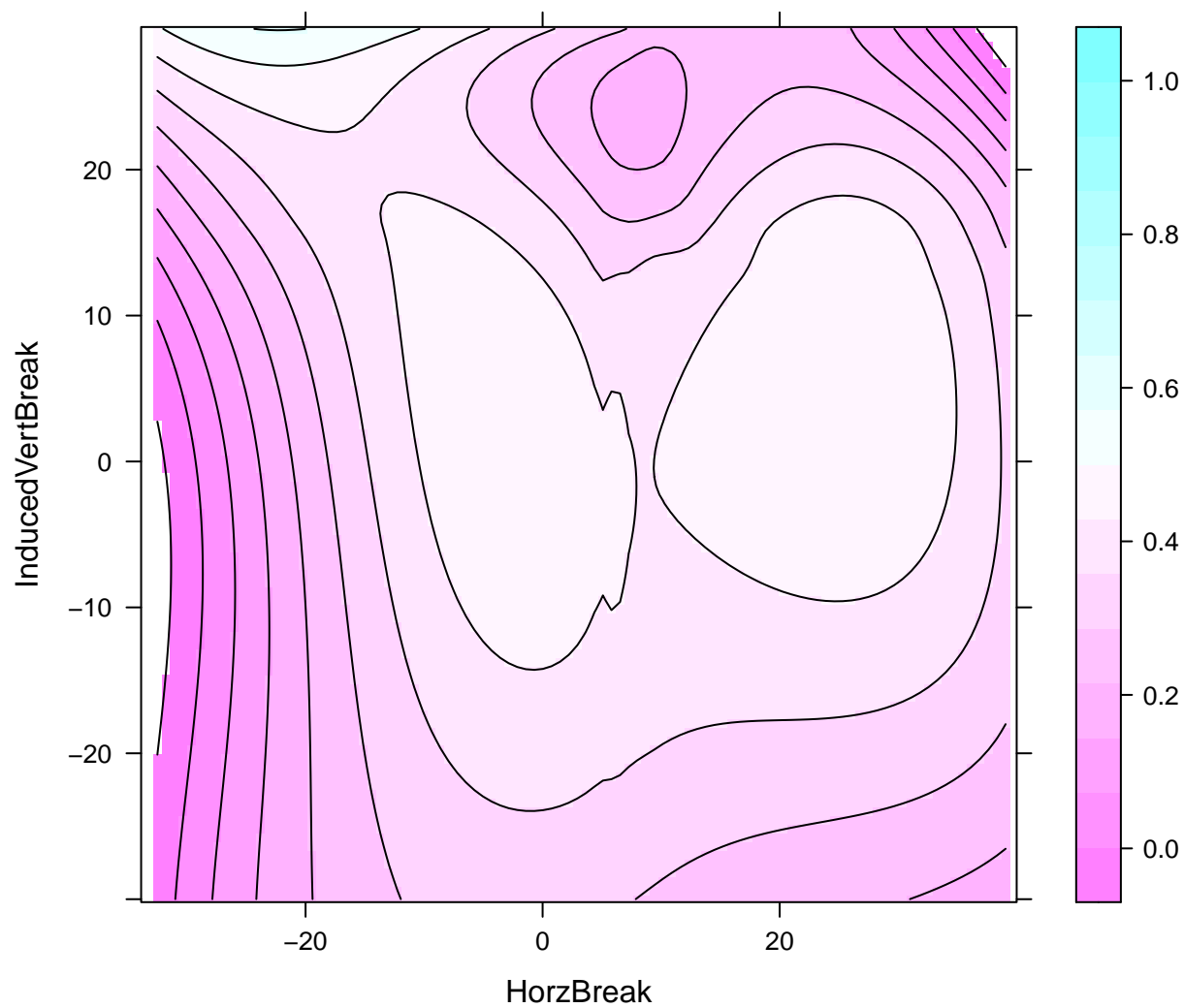
Ground Ball Sweet Spot for Righty Fastball Approximate Angle



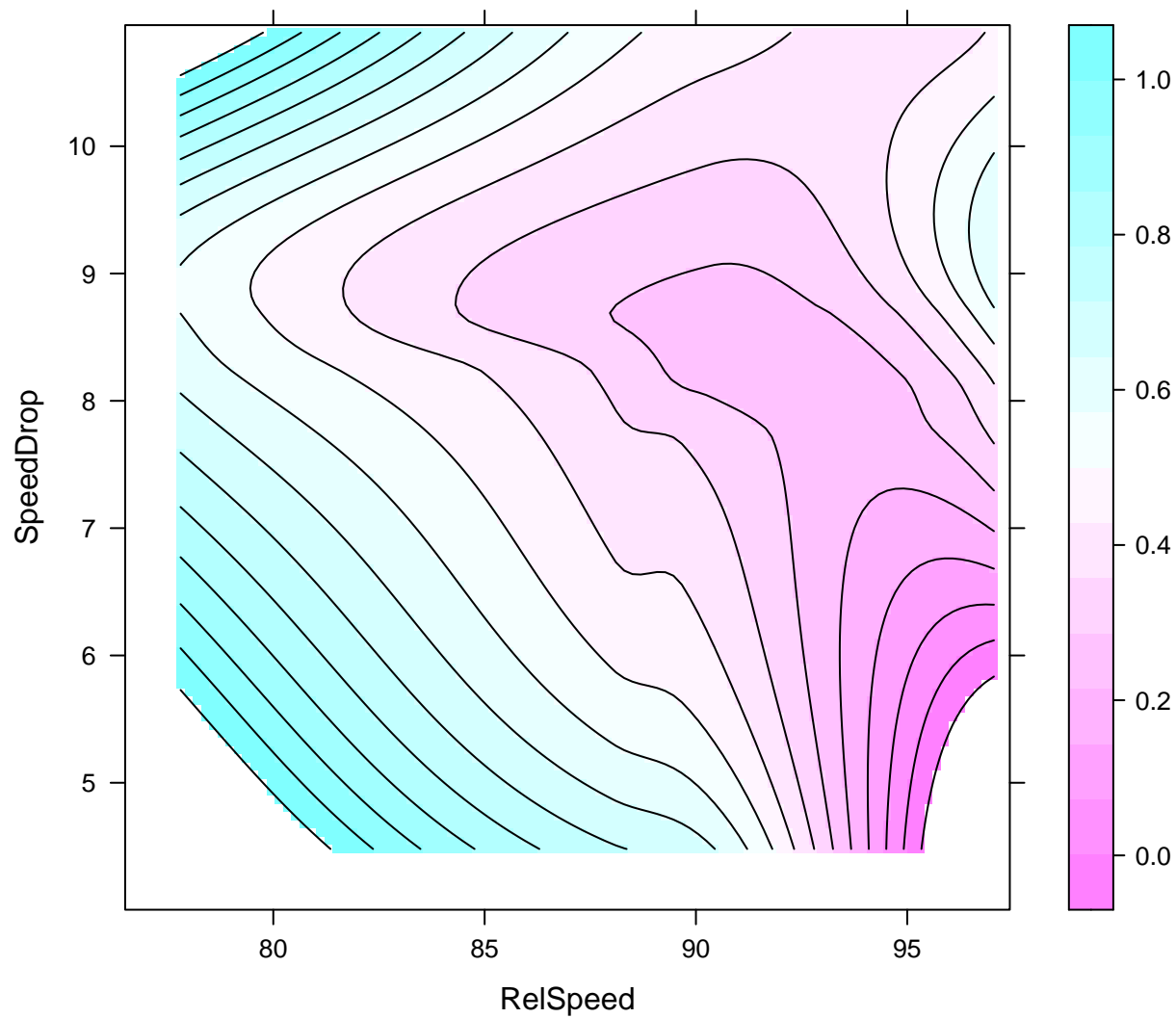
Ground Ball Sweet Spot for Righty Fastball Movement



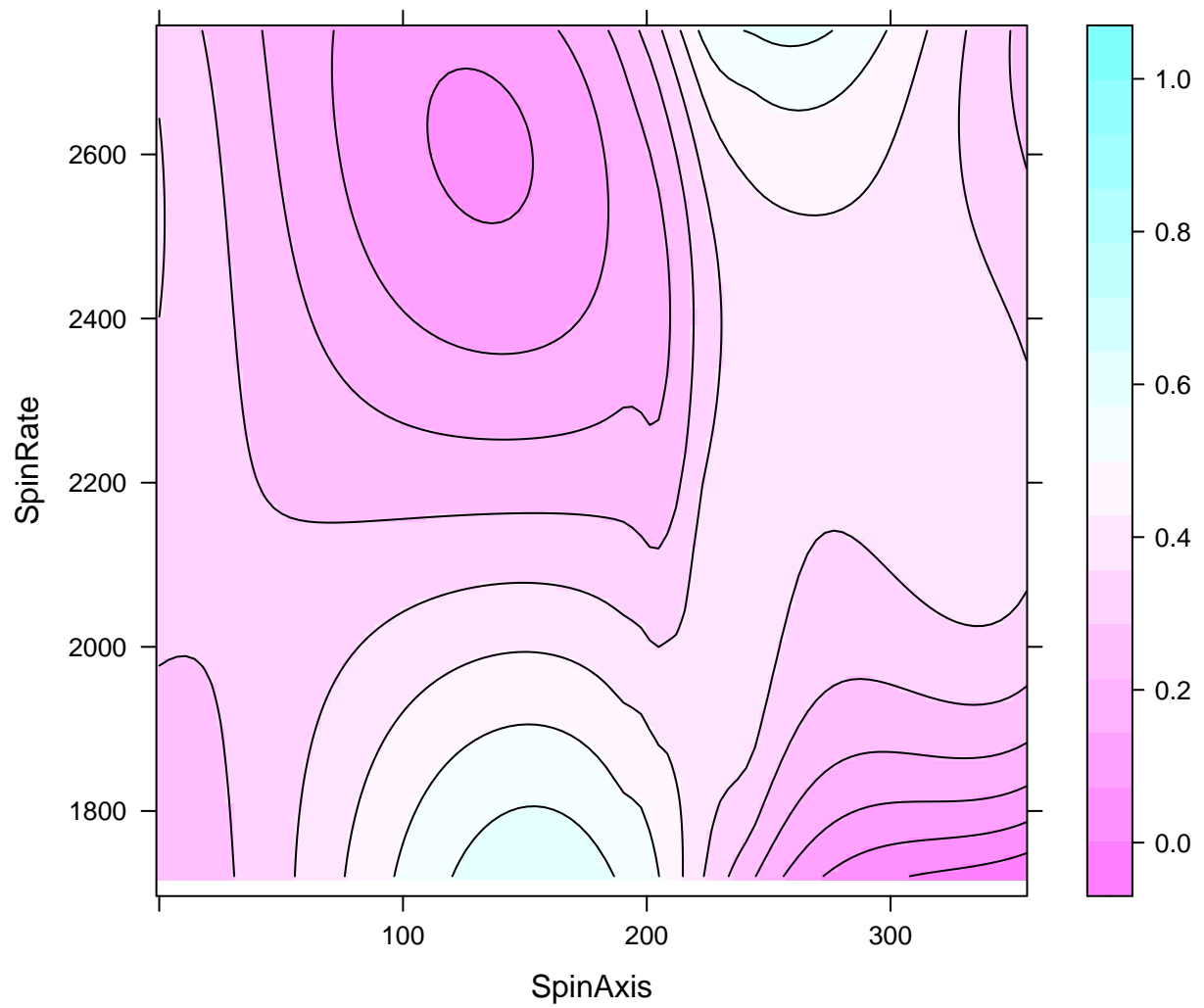
Ground Ball Sweet Spot for Righty Fastball Break



Ground Ball Sweet Spot for Righty Fastball Speed and Drop

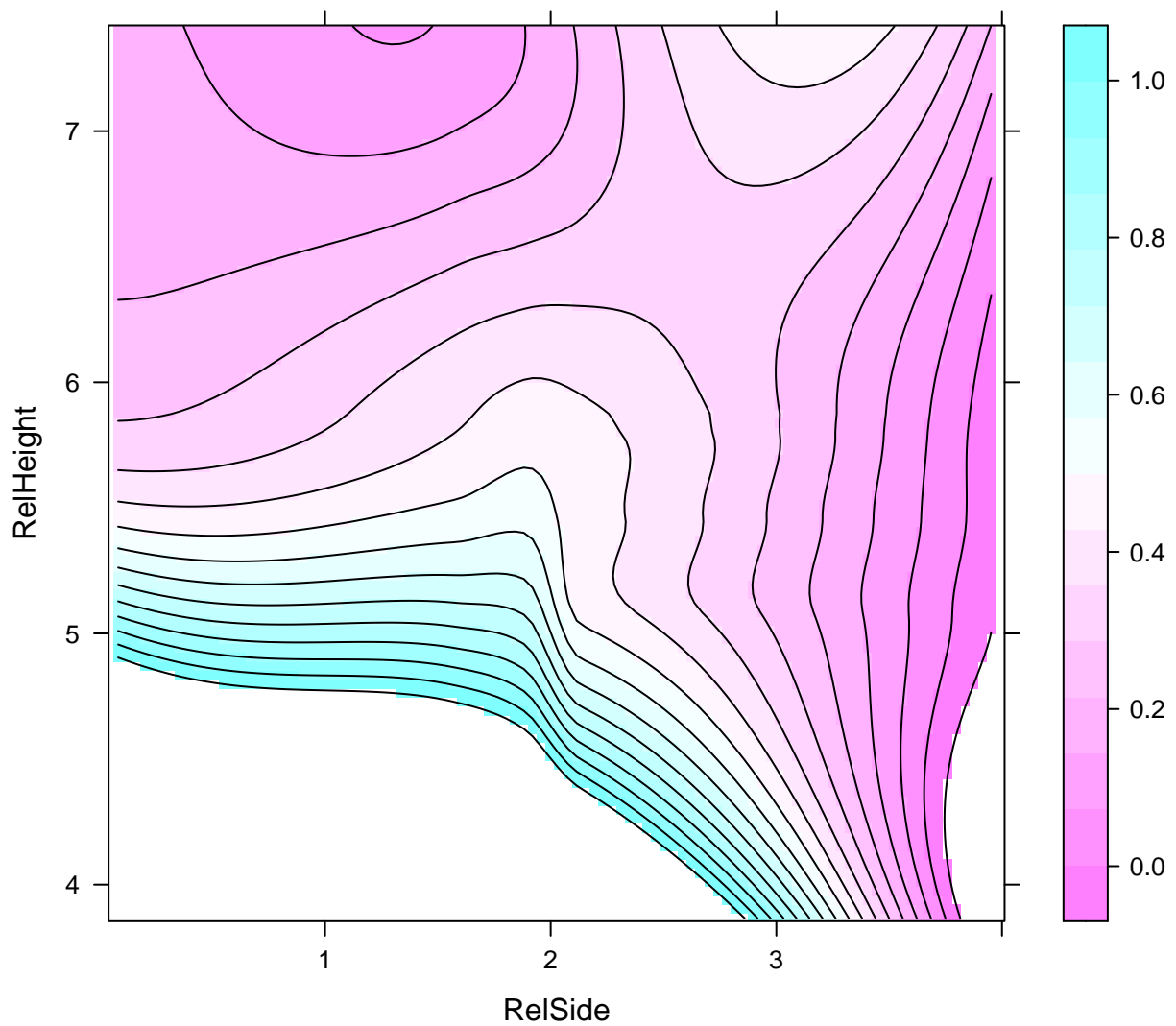


Ground Ball Sweet Spot for Righty Fastball Spin

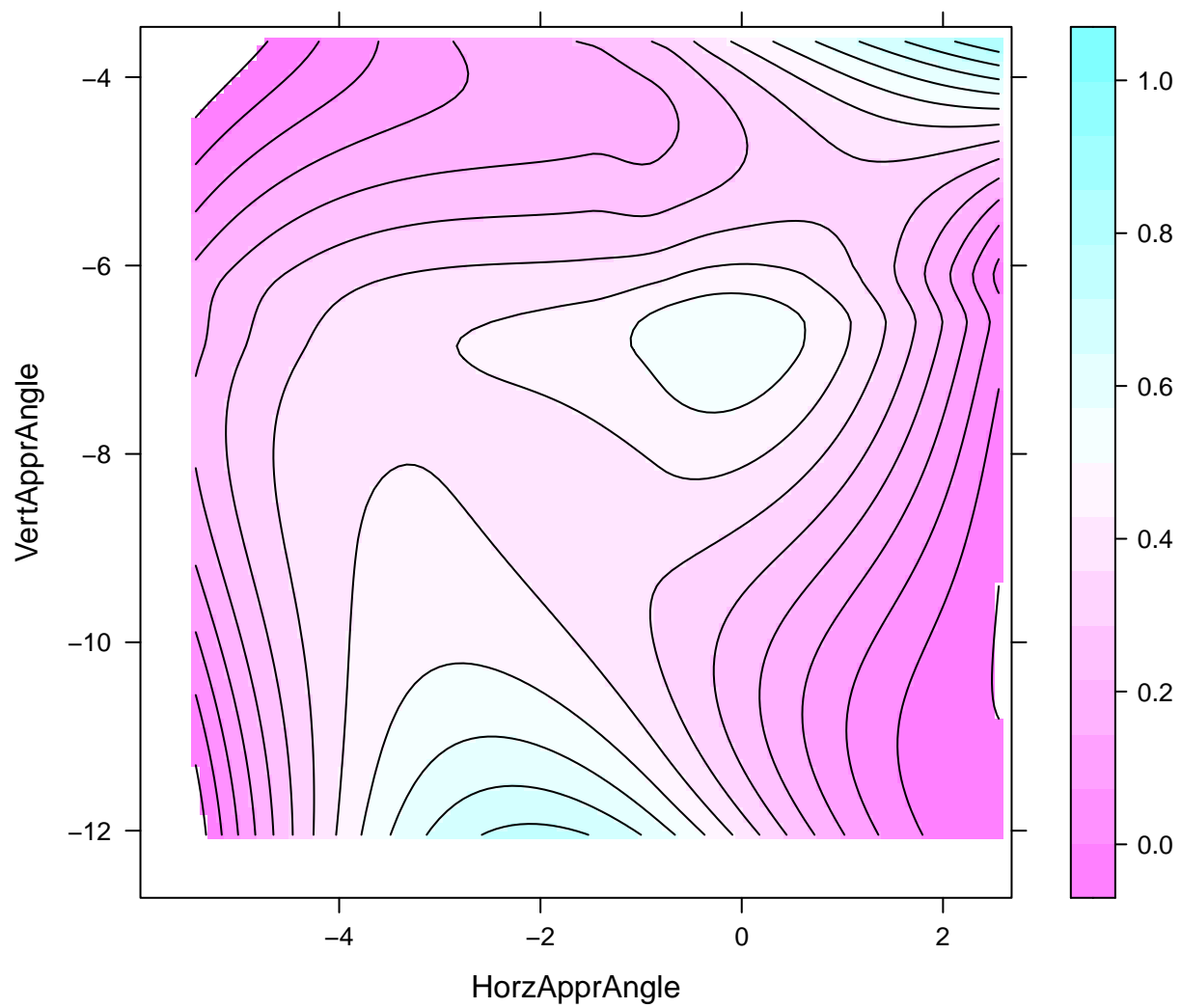


Right Handed Sinker

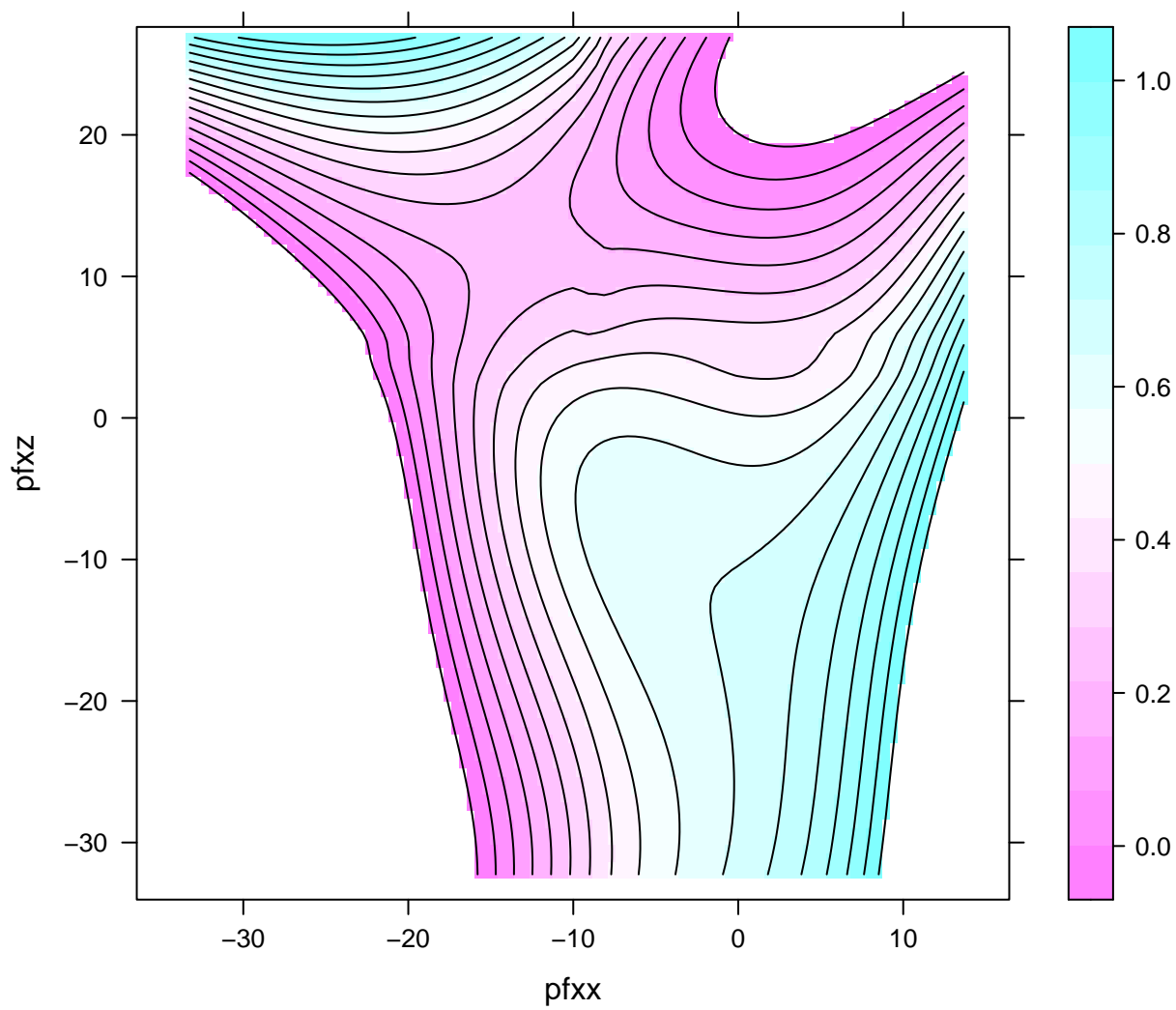
Ground Ball Sweet Spot for Righty Sinker Release Coordinates



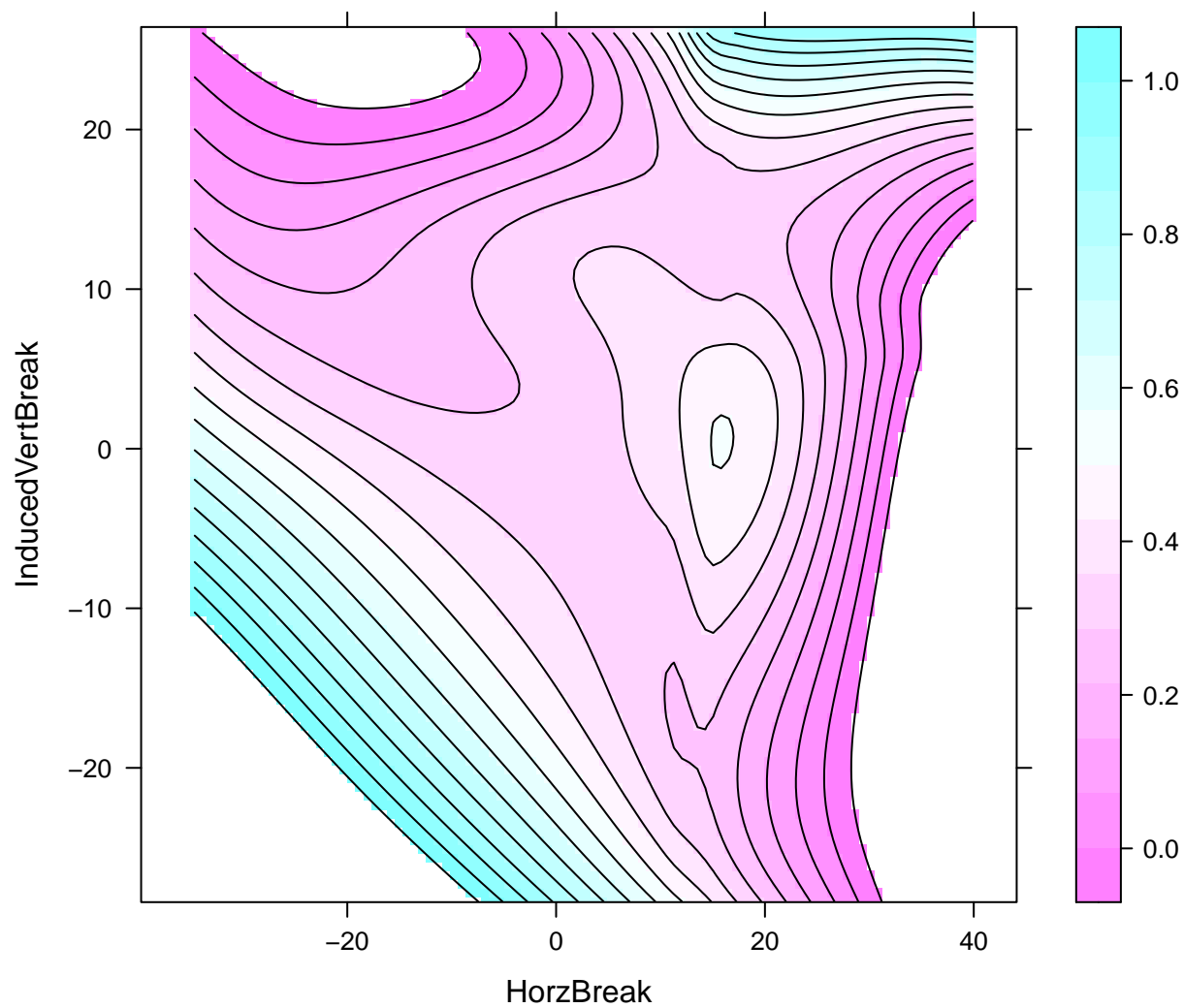
Ground Ball Sweet Spot for Righty Sinker Approximate Angle



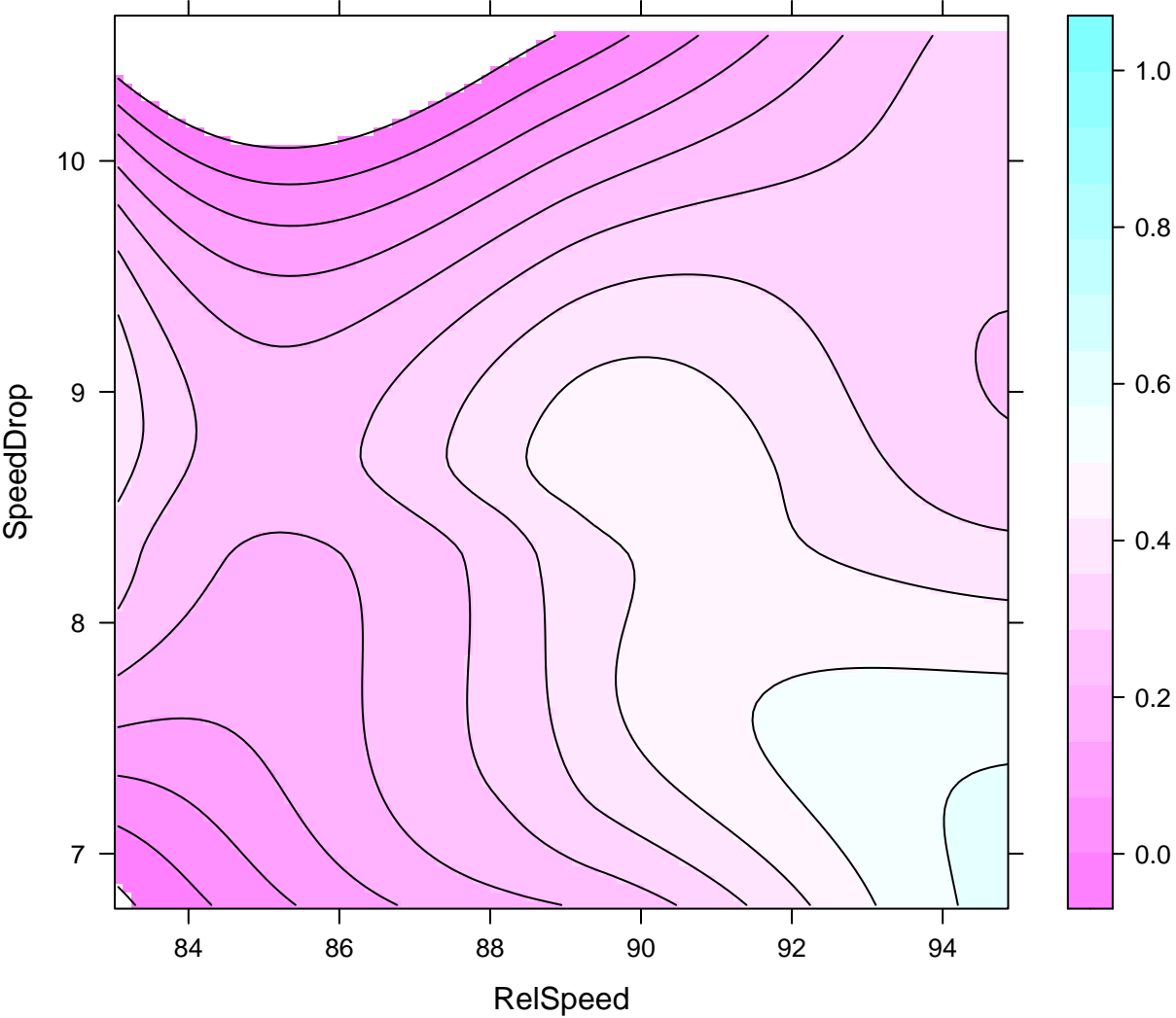
Ground Ball Sweet Spot for Righty Sinker Movement



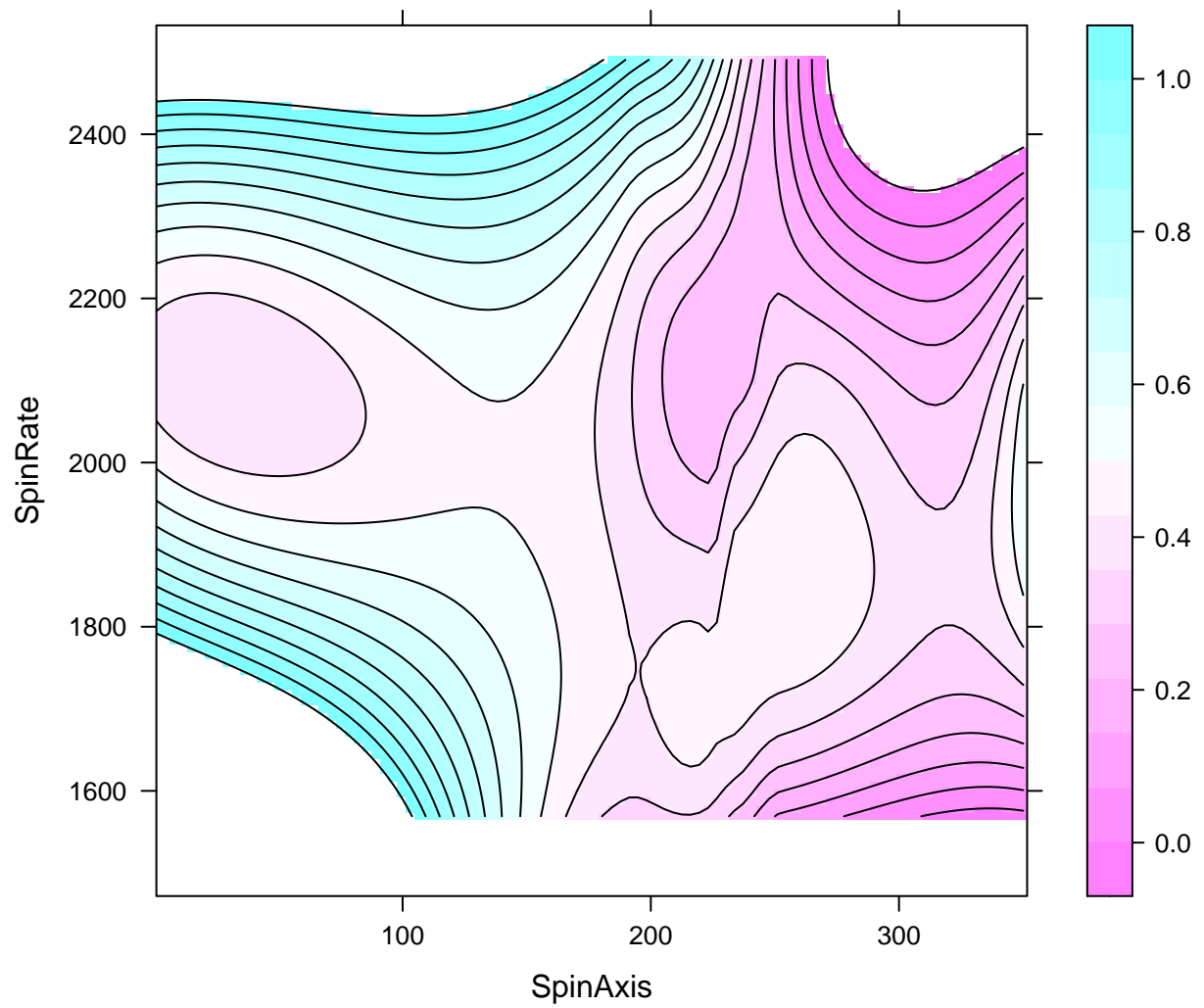
Ground Ball Sweet Spot for Righty Sinker Break



Ground Ball Sweet Spot for Righty Sinker Speed and Drop

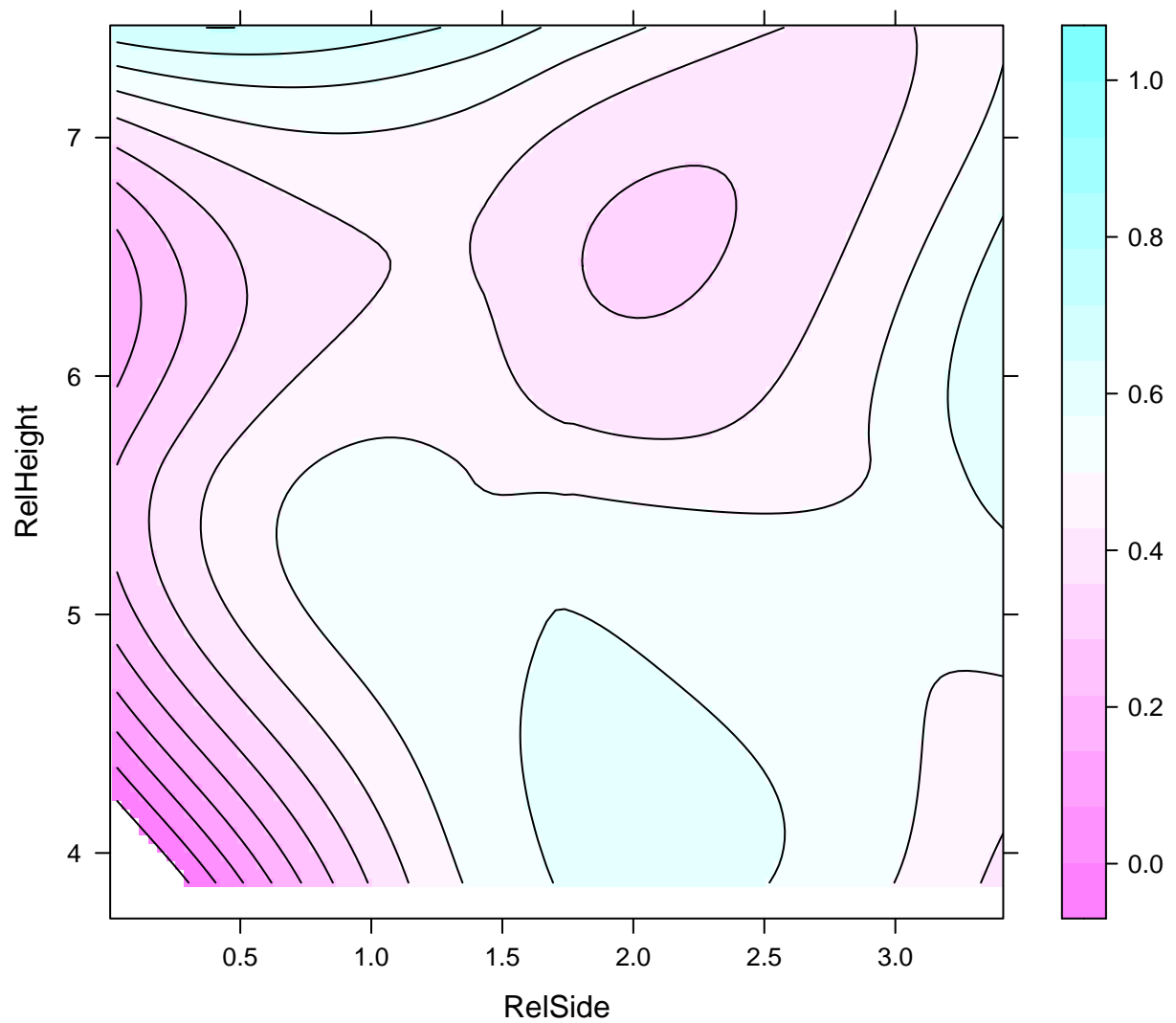


Ground Ball Sweet Spot for Righty Sinker Spin

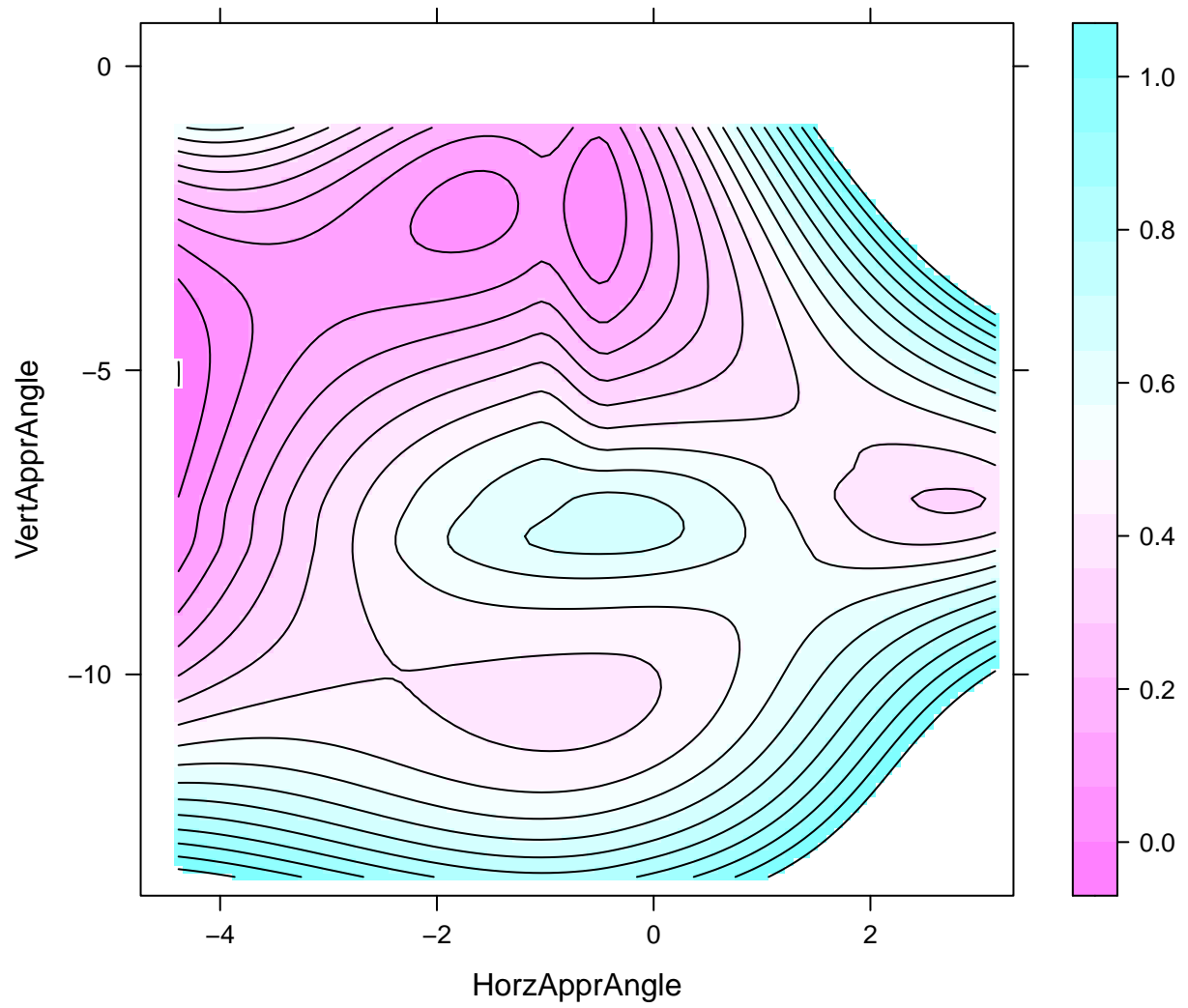


Right Handed Changeup

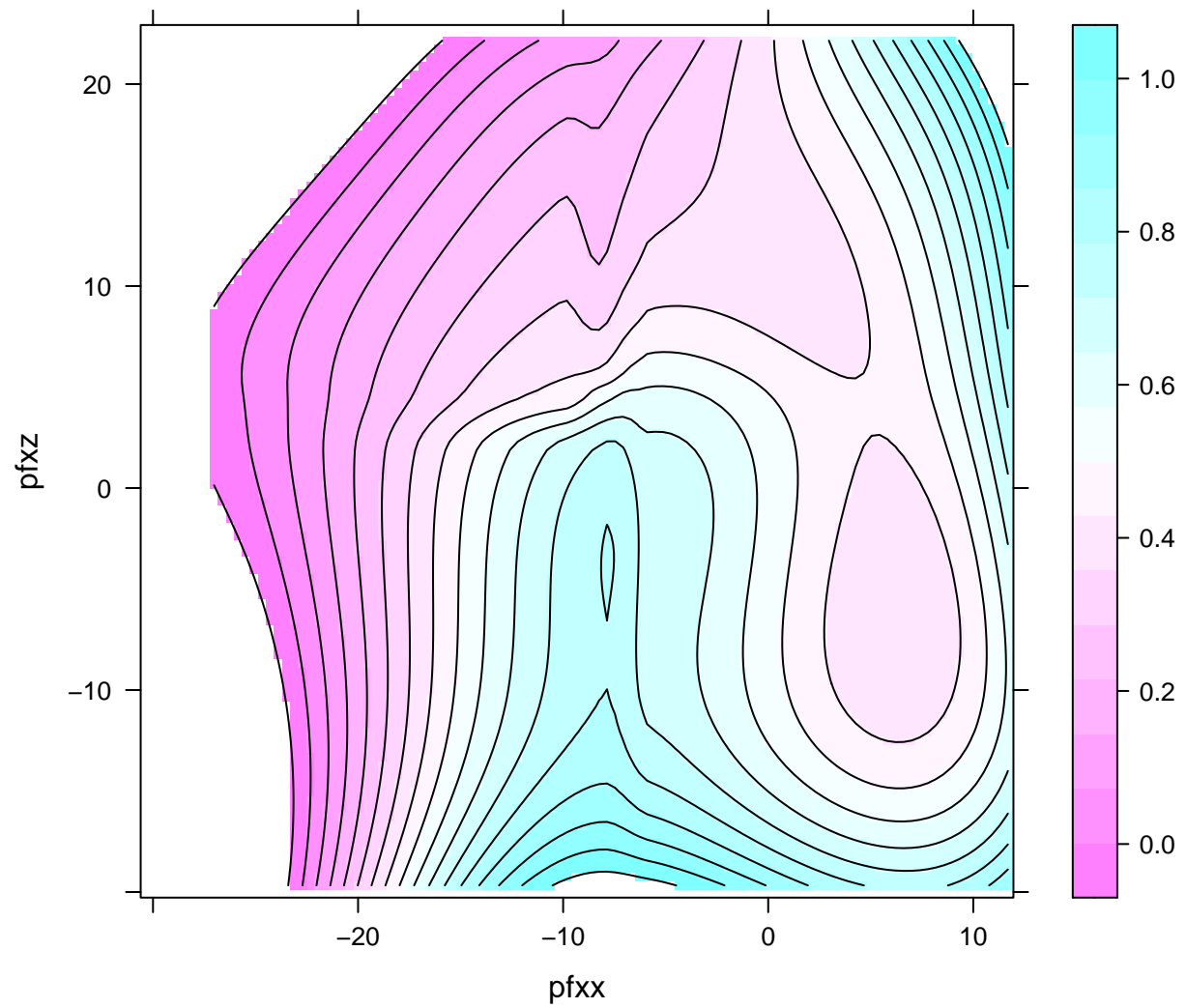
Ground Ball Sweet Spot for Righty Changeup Release Coordinates



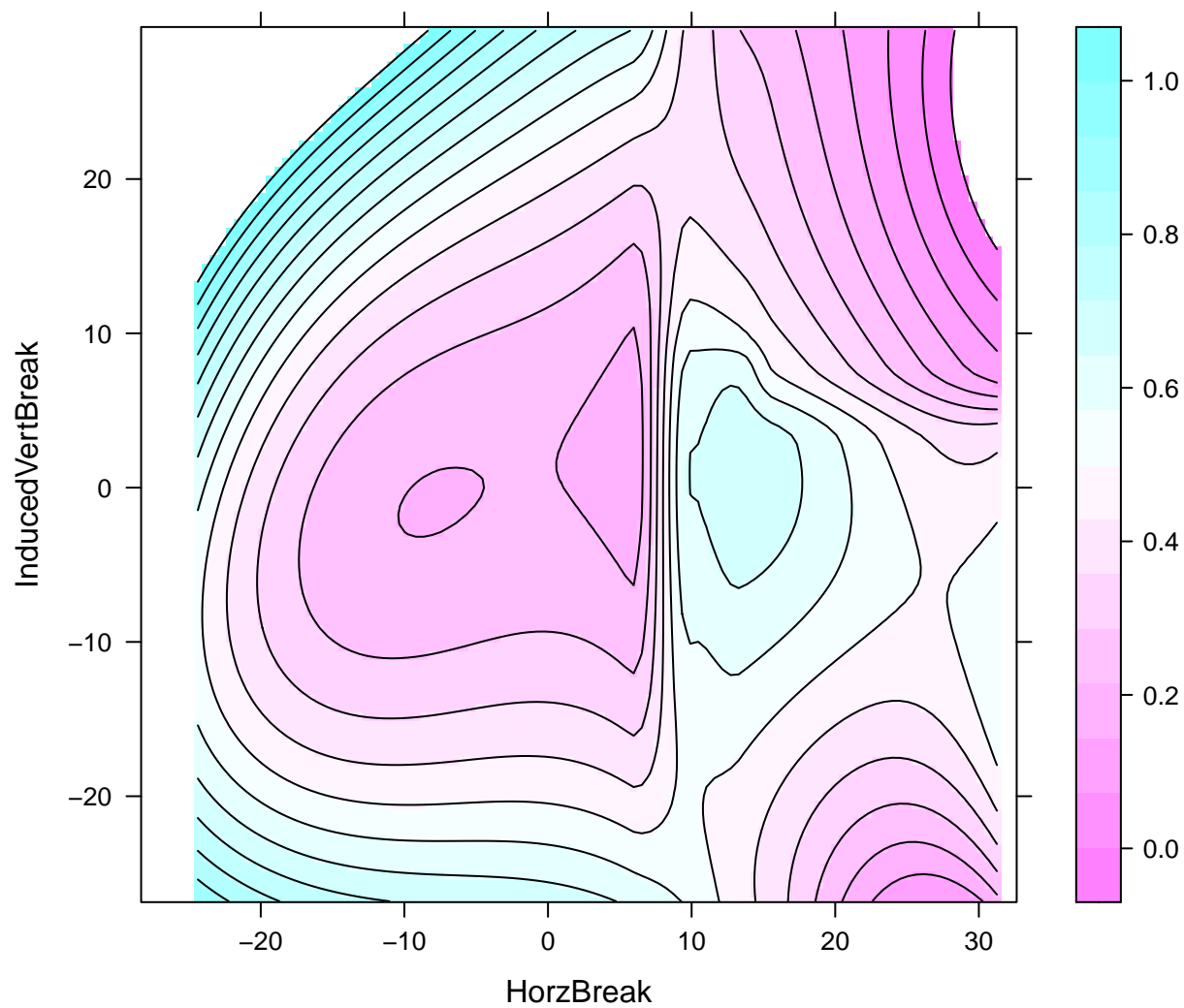
Ground Ball Sweet Spot for Righty Changeup Approximate Angle



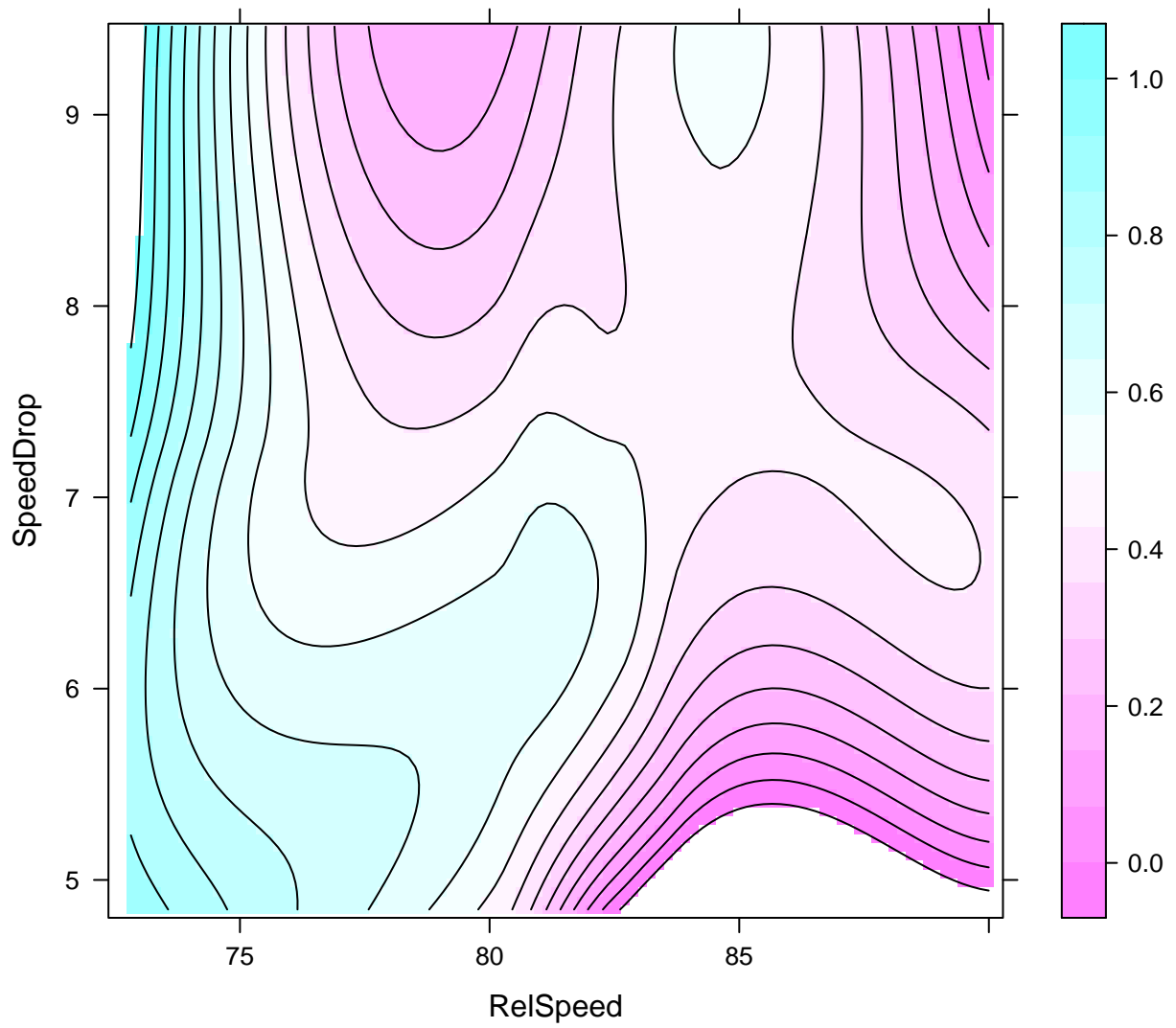
Ground Ball Sweet Spot for Righty Changeup Movement



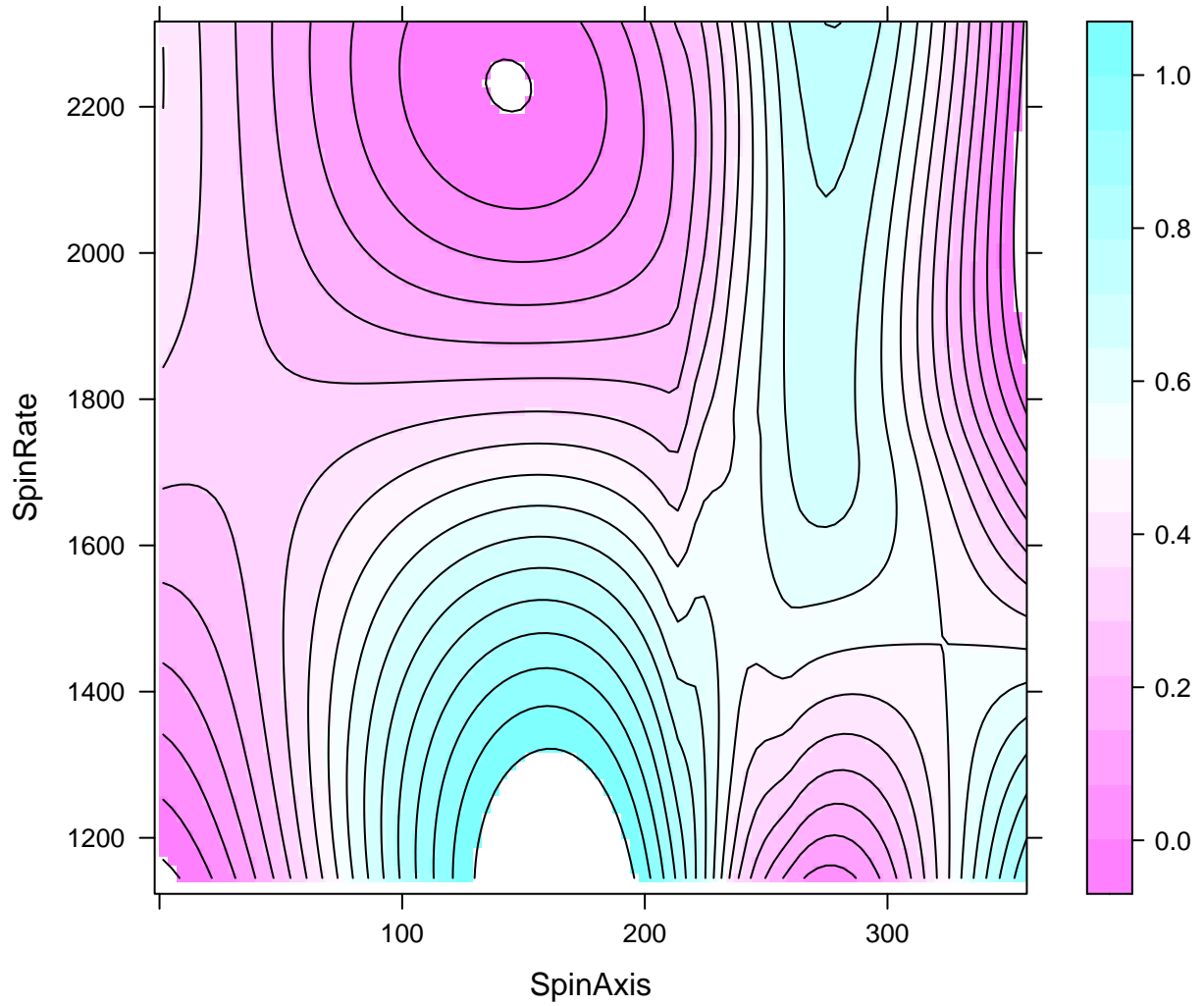
Ground Ball Sweet Spot for Righty Changeup Break



Ground Ball Sweet Spot for Righty Changeup Speed and Drop

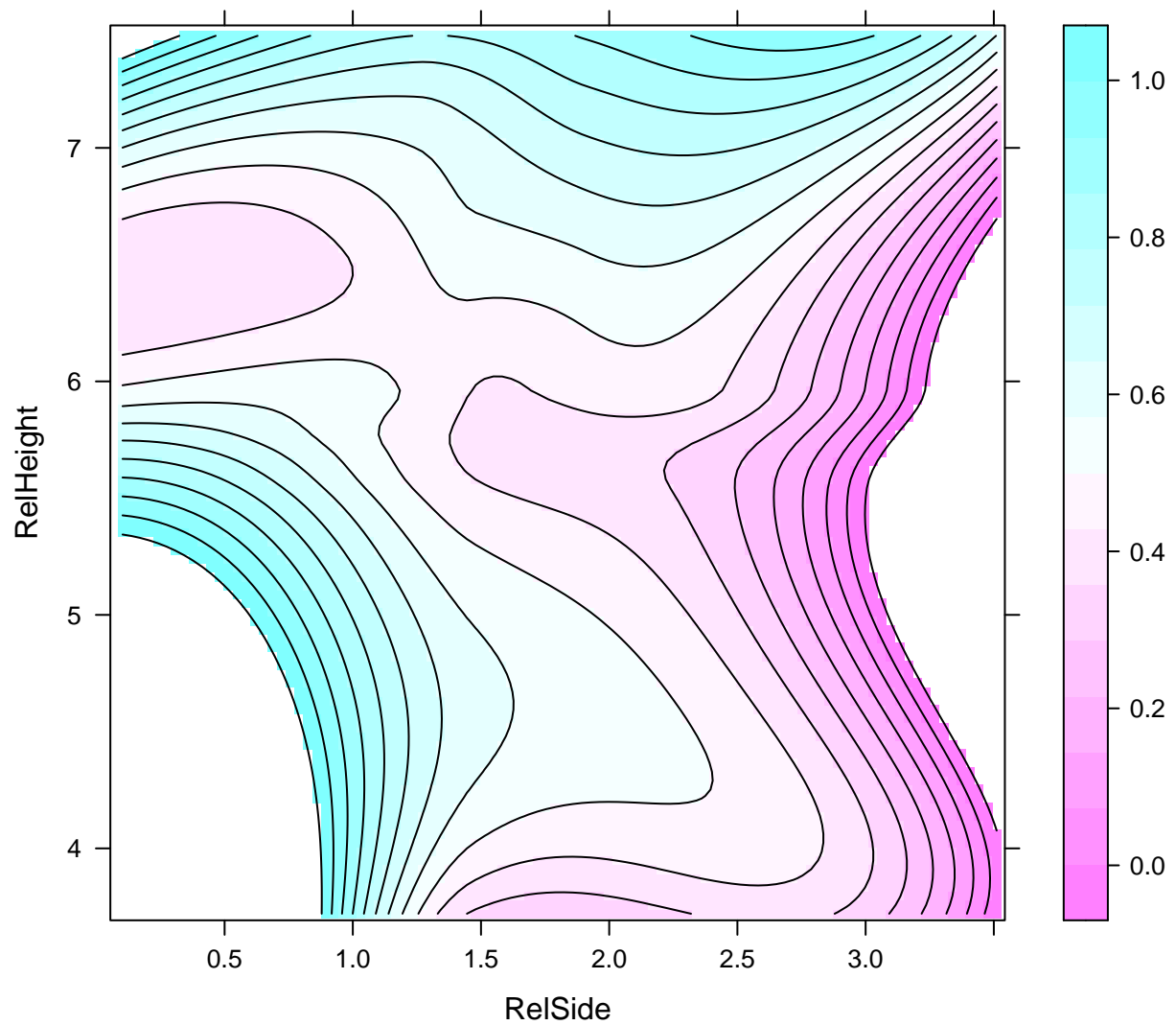


Ground Ball Sweet Spot for Righty Changeup Spin

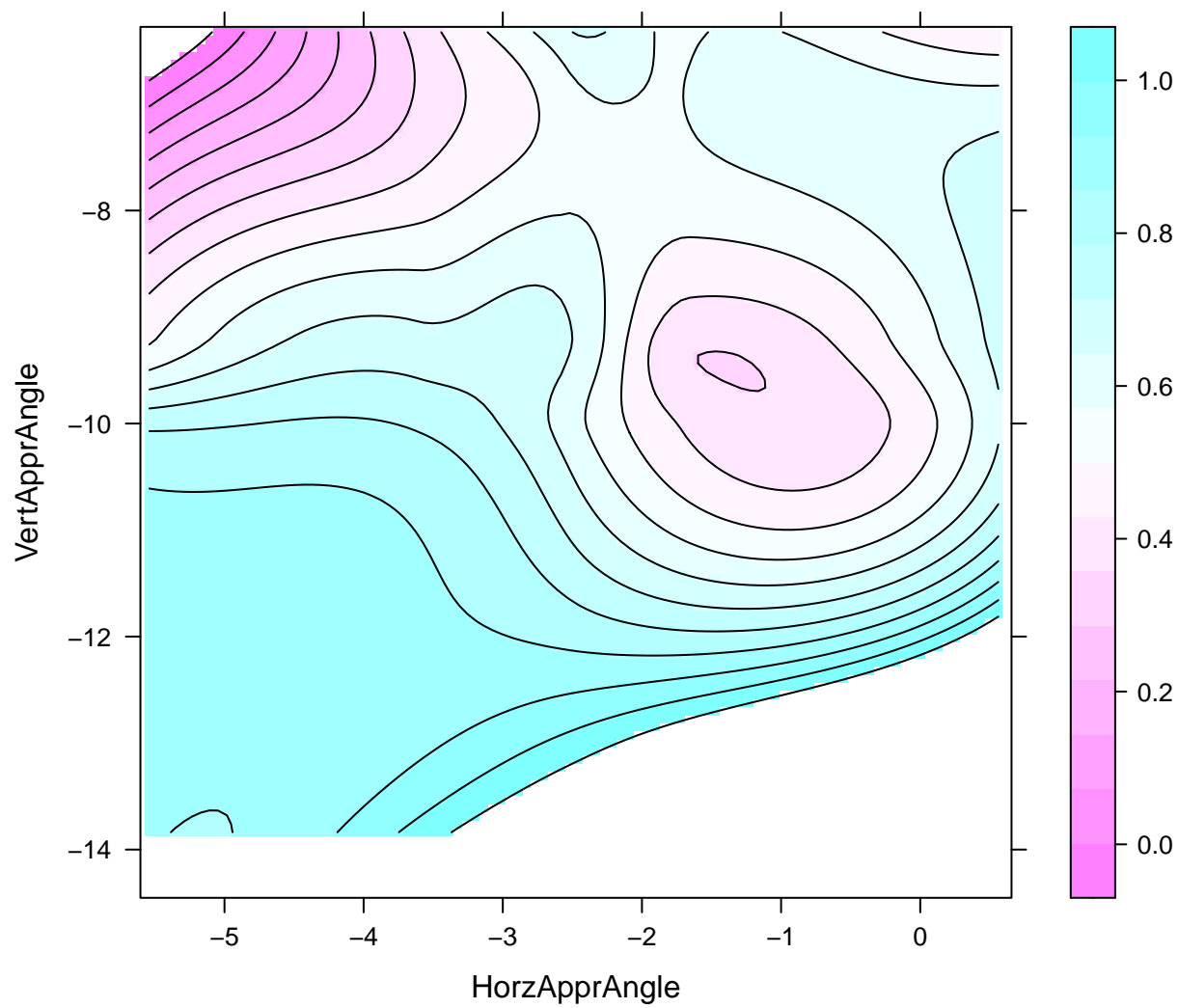


Right Handed Curveball

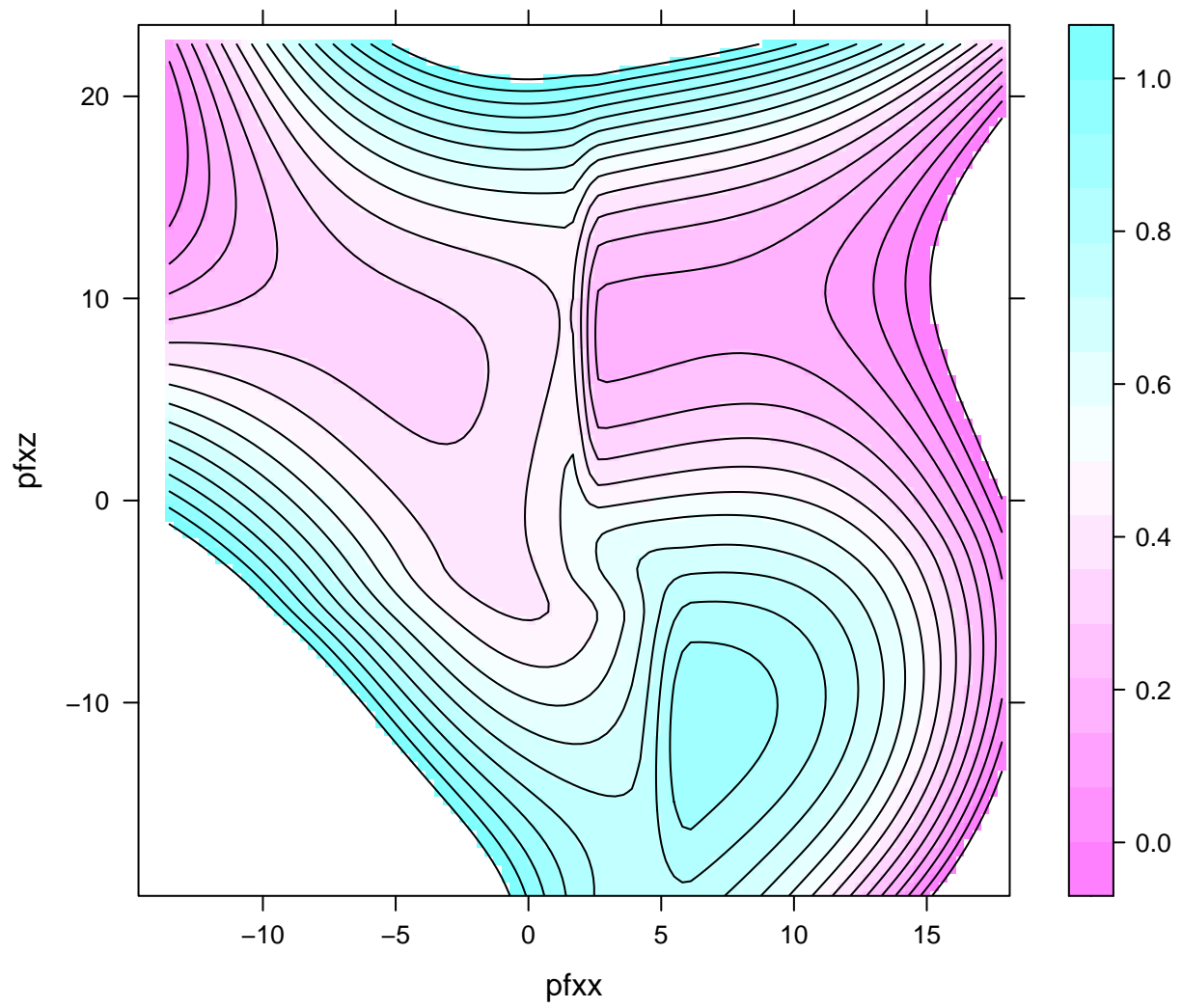
Ground Ball Sweet Spot for Righty Curveball Release Coordinates



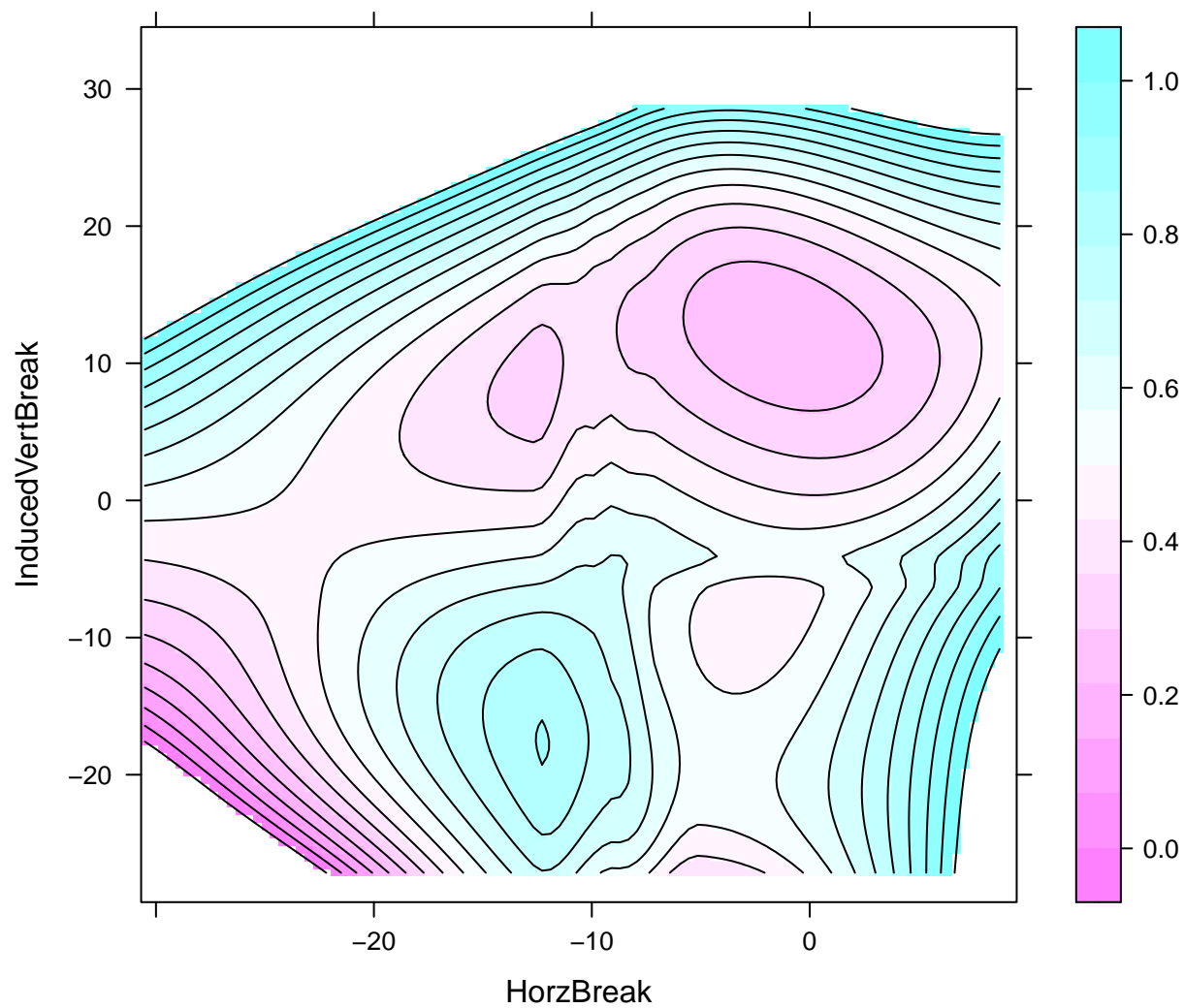
Ground Ball Sweet Spot for Righty Curveball Approximate Angle



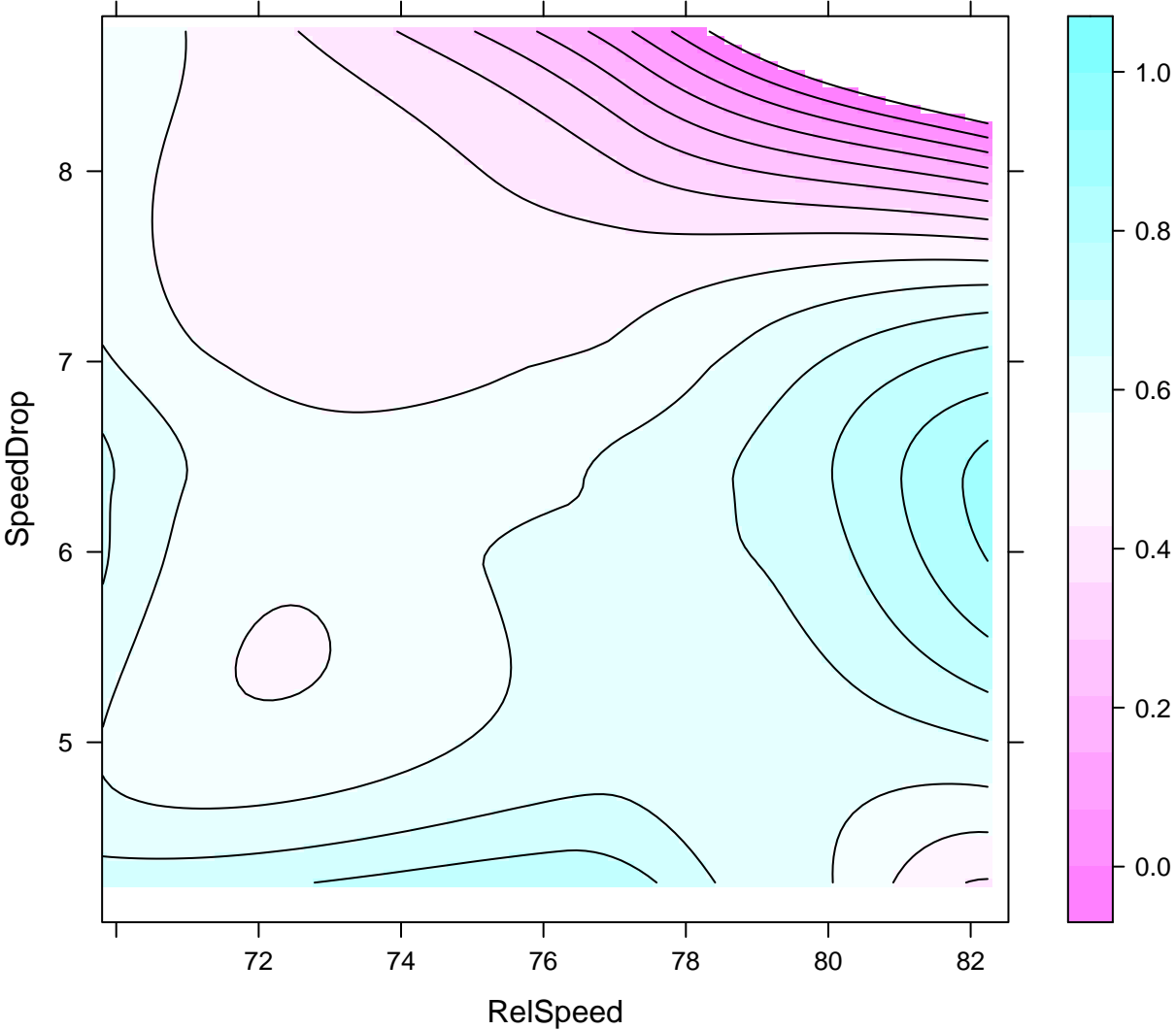
Ground Ball Sweet Spot for Righty Curveball Movement



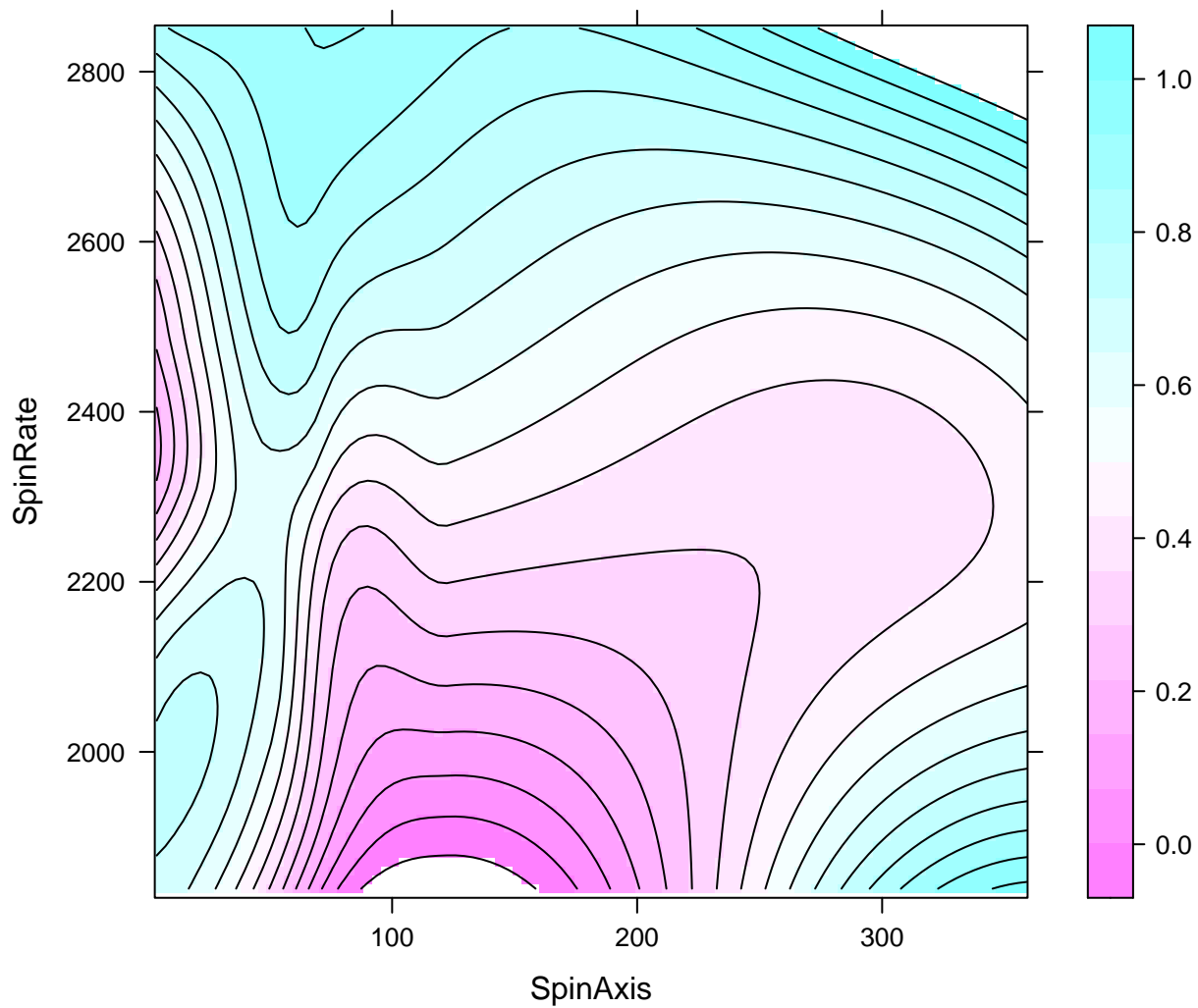
Ground Ball Sweet Spot for Righty Curveball Break



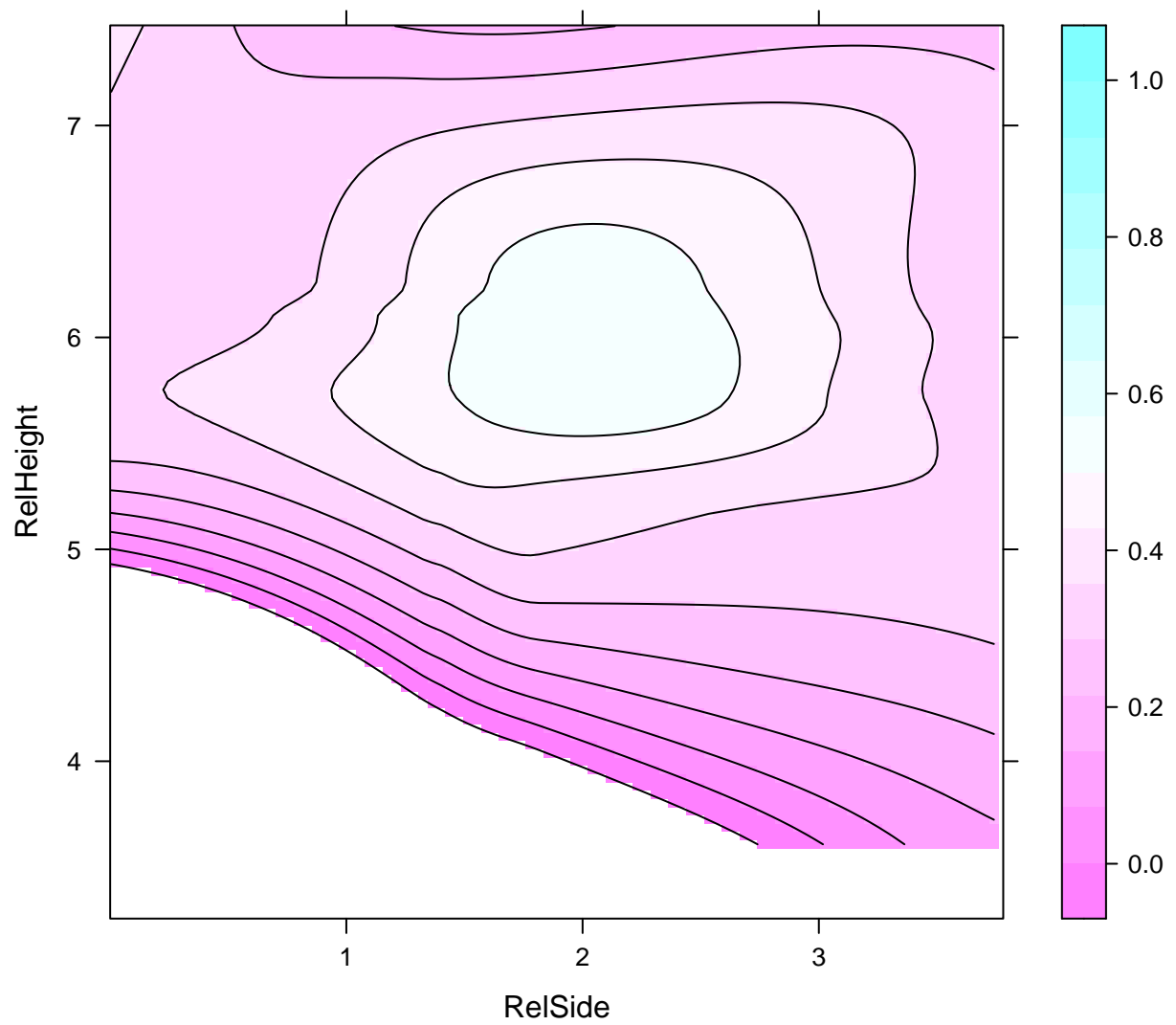
Ground Ball Sweet Spot for Righty Curveball Speed and Drop



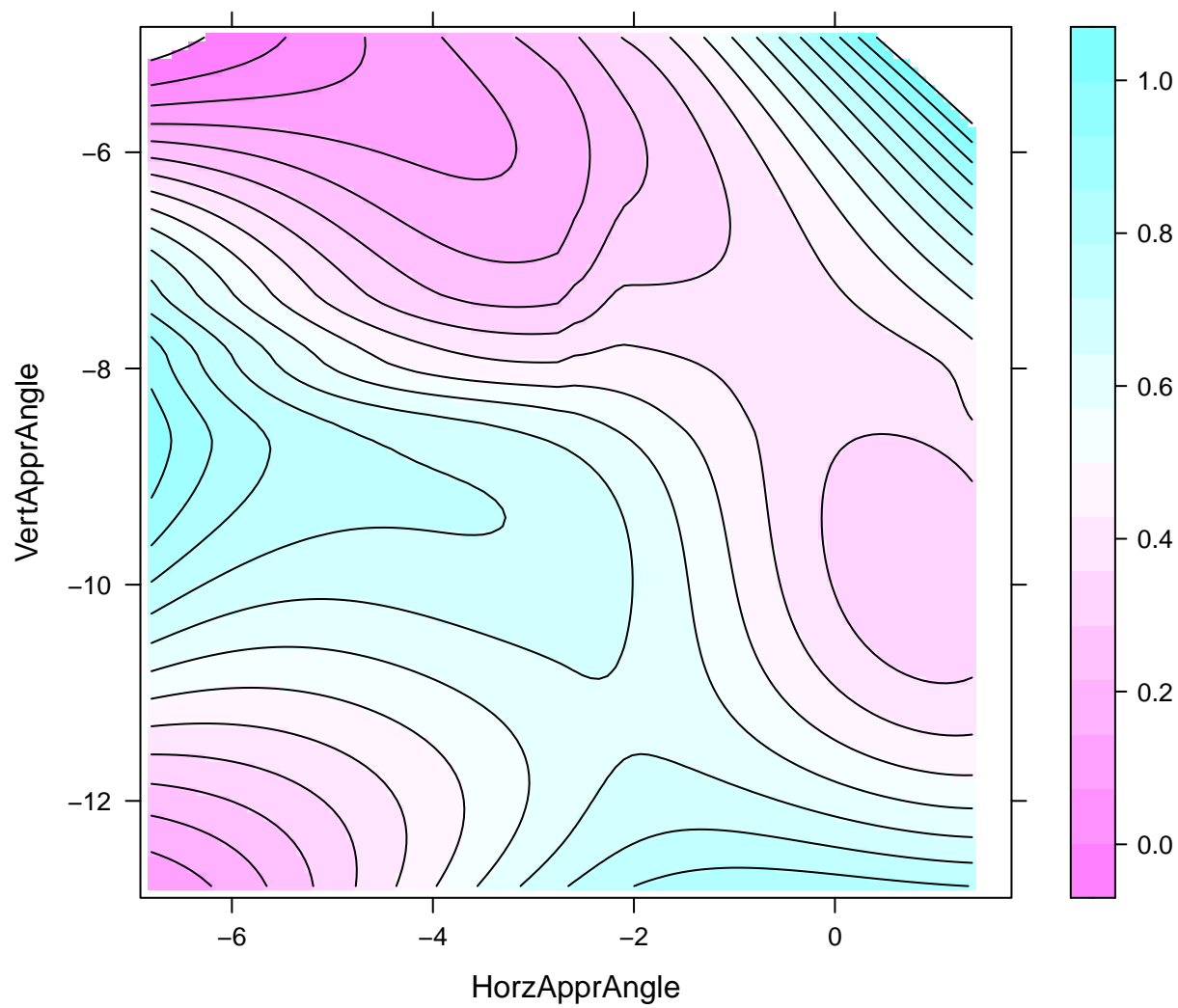
Ground Ball Sweet Spot for Righty Curveball Spin



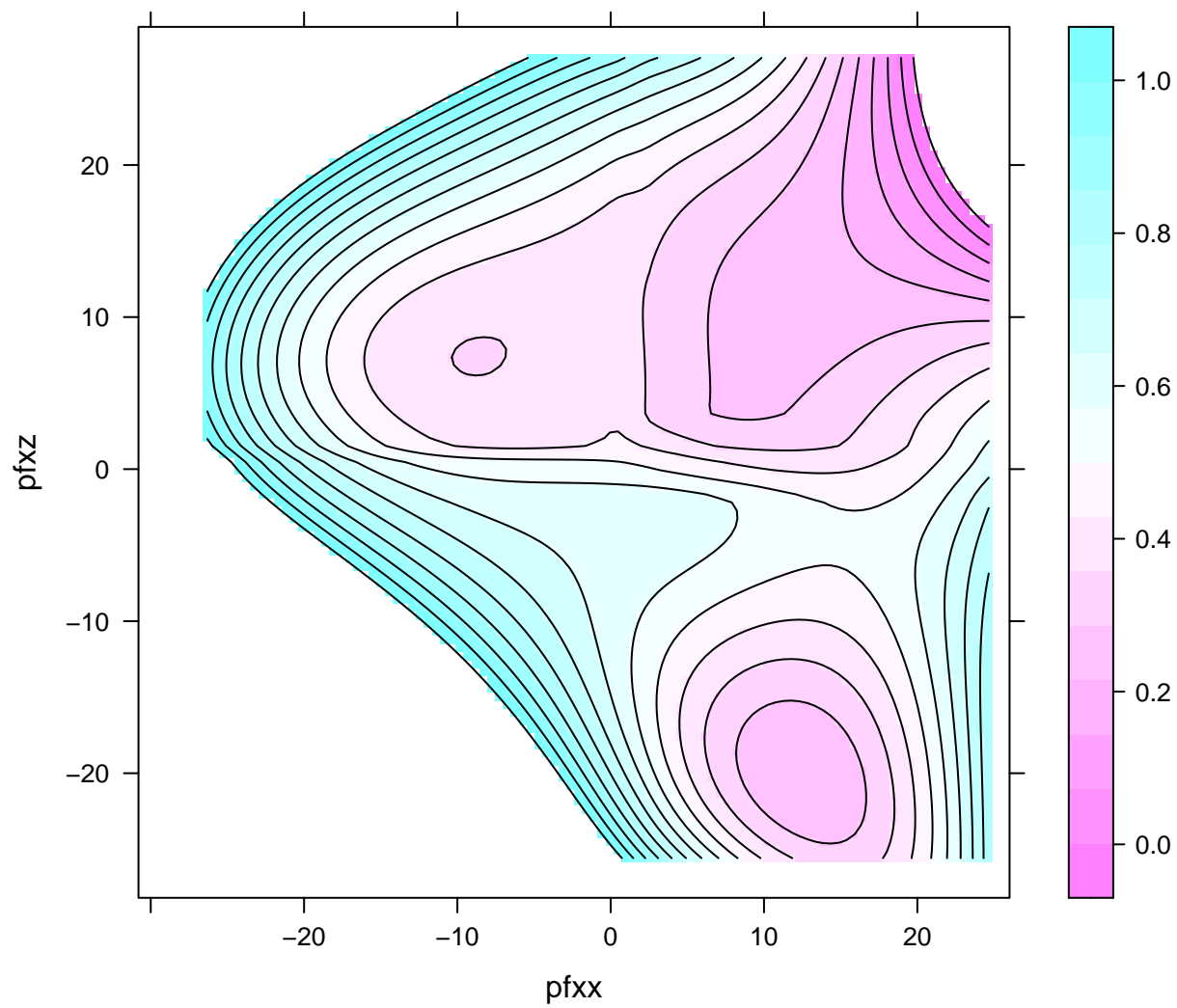
Ground Ball Sweet Spot for Righty Slider Release Coordinates



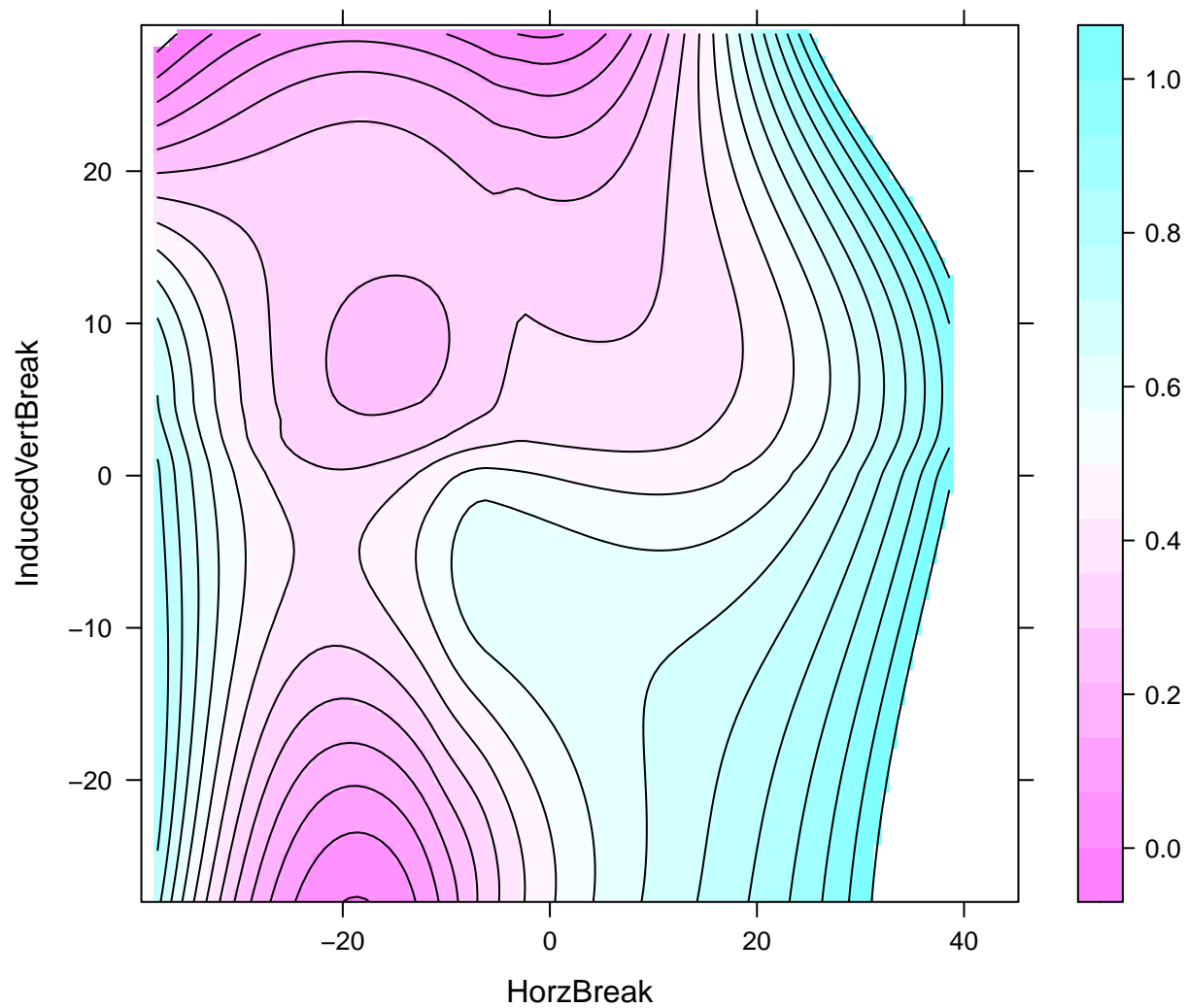
Ground Ball Sweet Spot for Righty Slider Approximate Angle



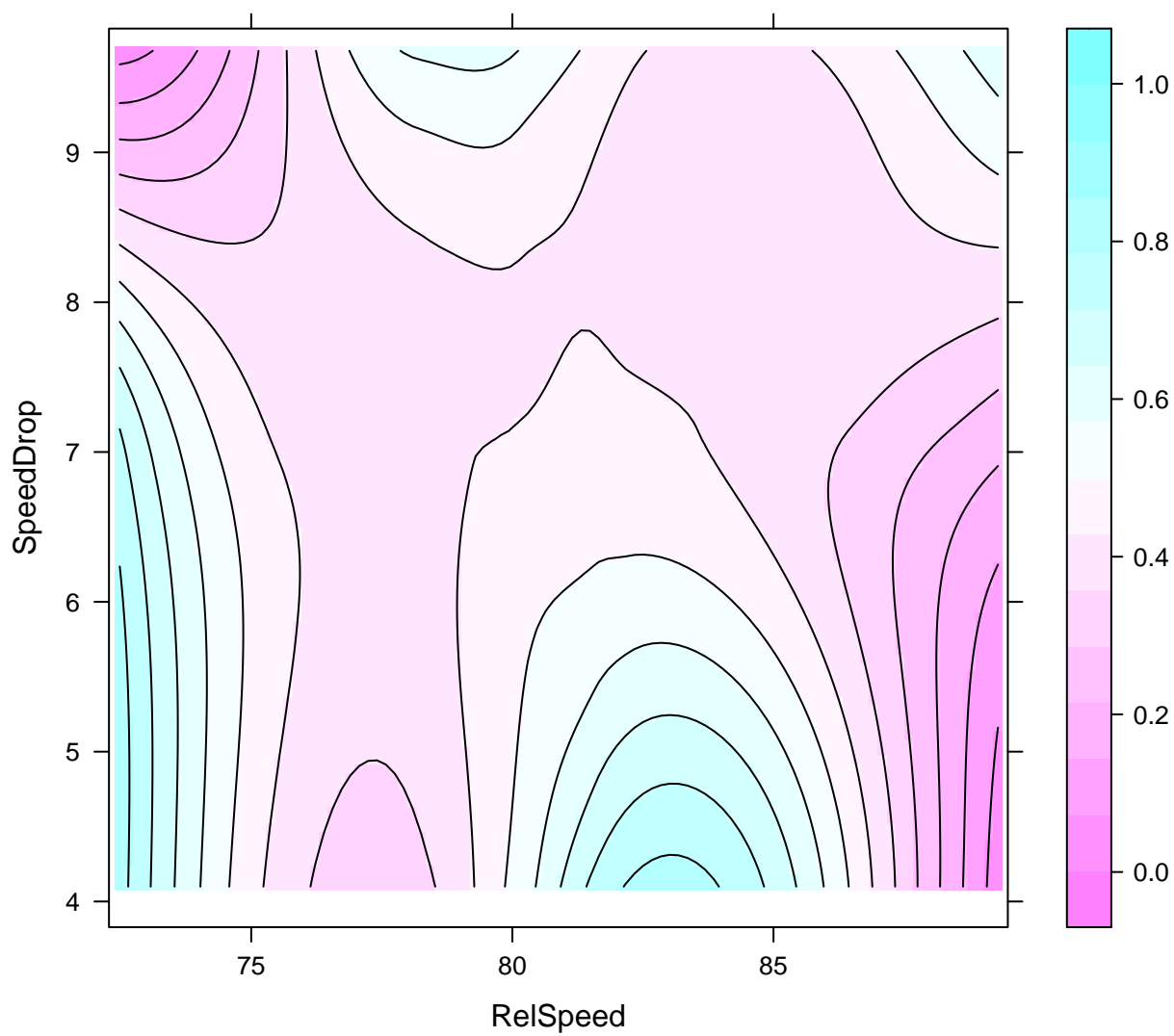
Ground Ball Sweet Spot for Righty Slider Movement



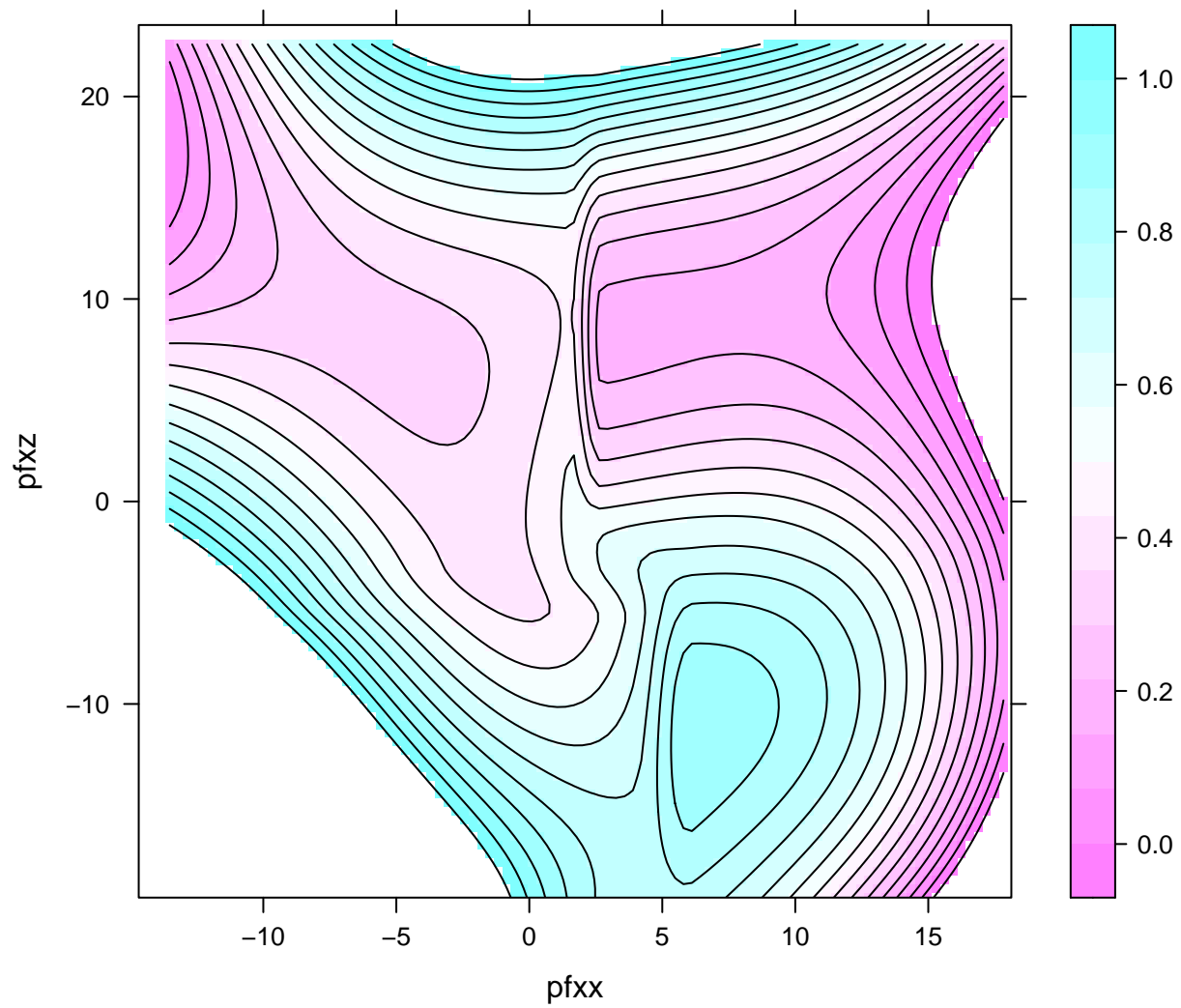
Ground Ball Sweet Spot for Righty Slider Break



Ground Ball Sweet Spot for Righty Slider Speed and Drop



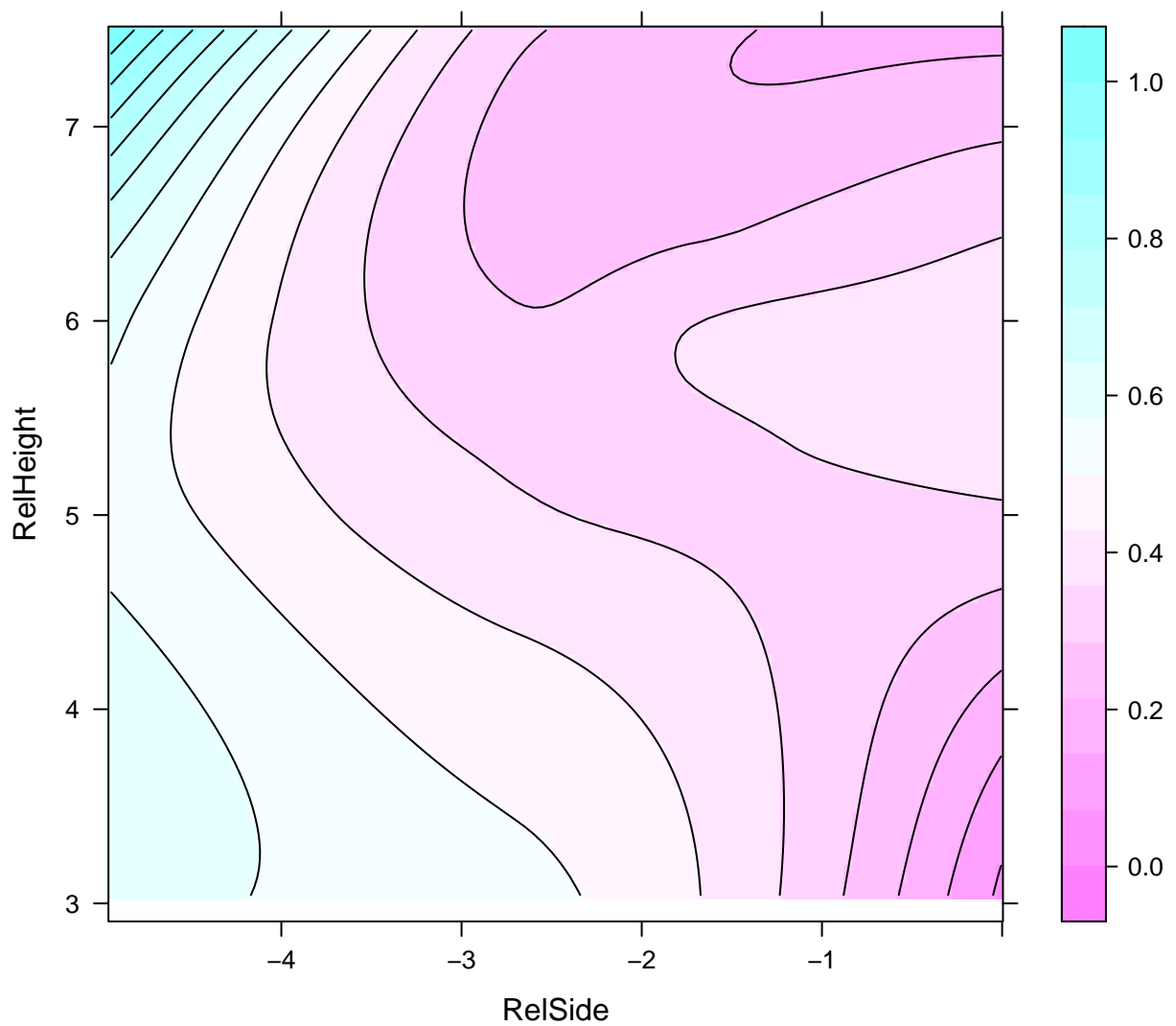
Ground Ball Sweet Spot for Righty Curveball Movement



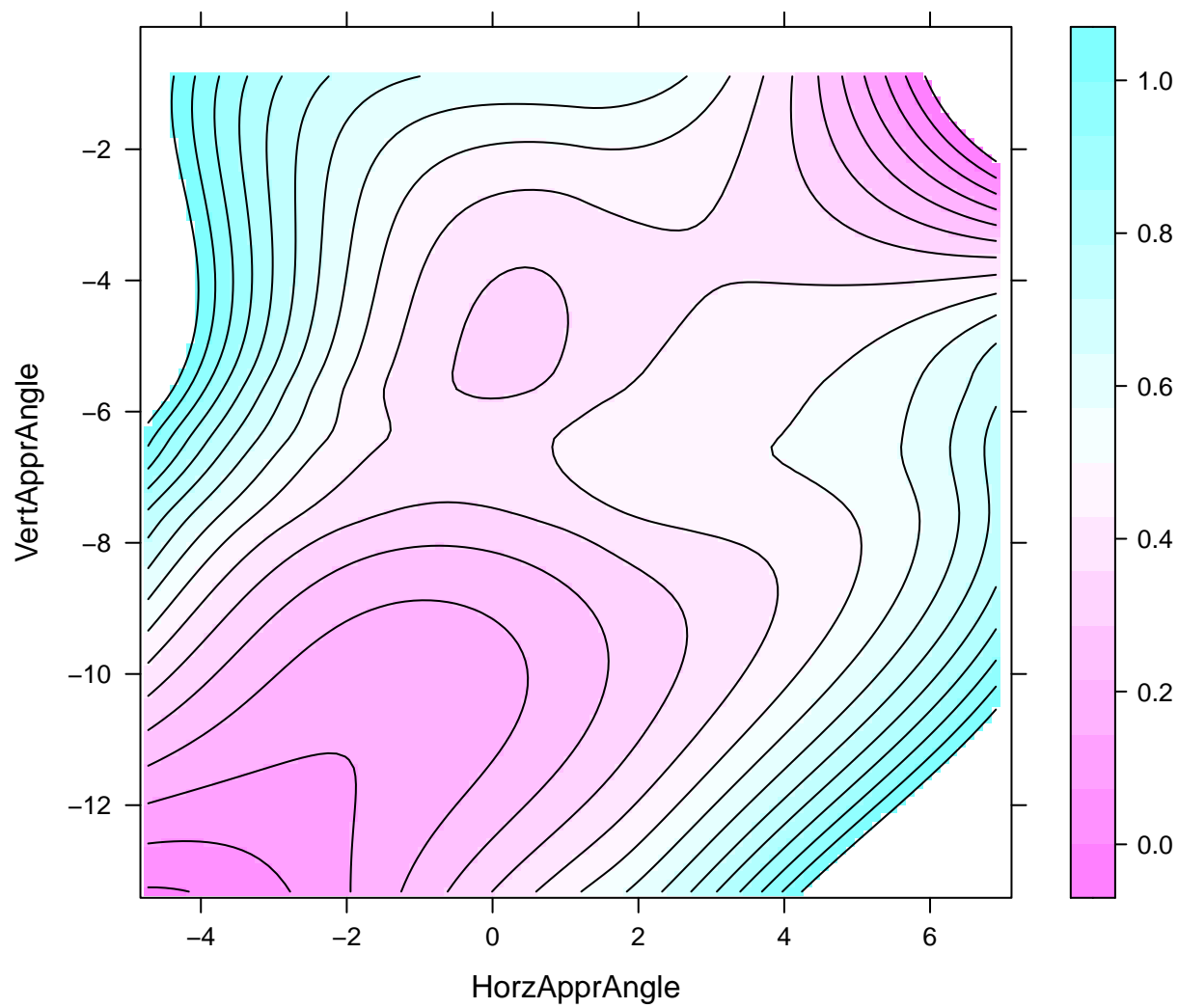
Left Handed Pitchers

Left Handed Fastball

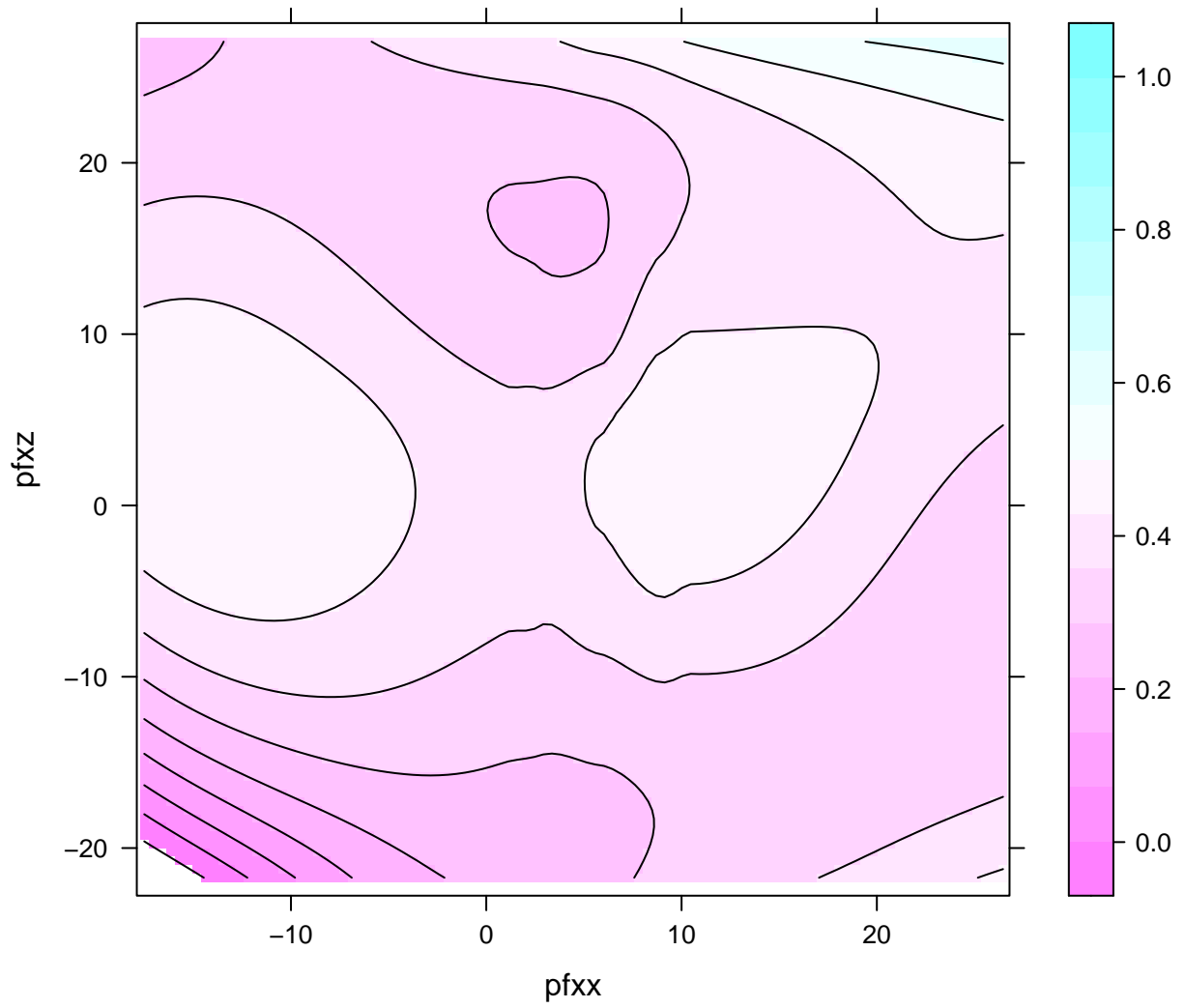
Ground Ball Sweet Spot for Lefty Fastball Release Coordinates



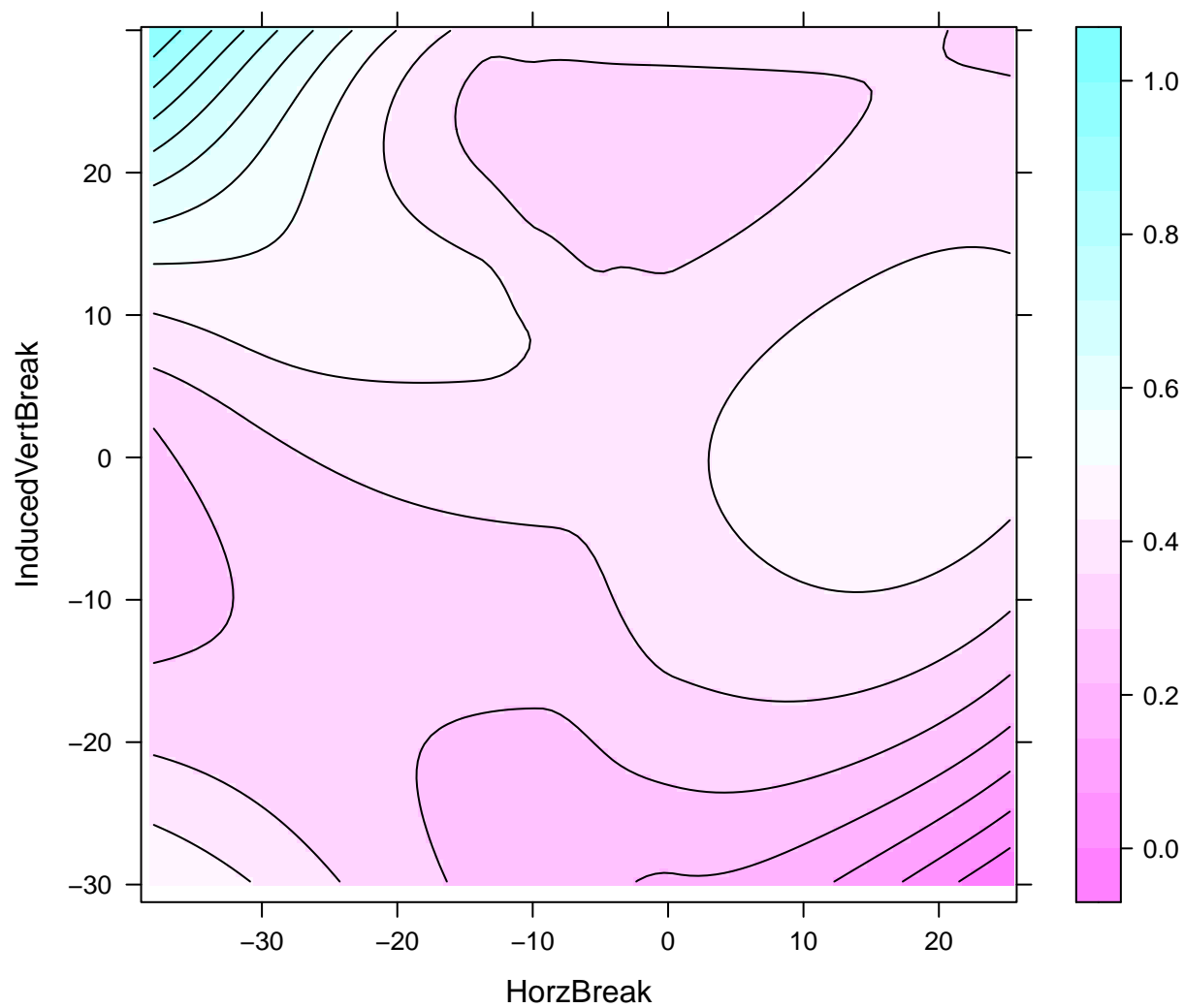
Ground Ball Sweet Spot for Lefty Fastball Approximate Angle



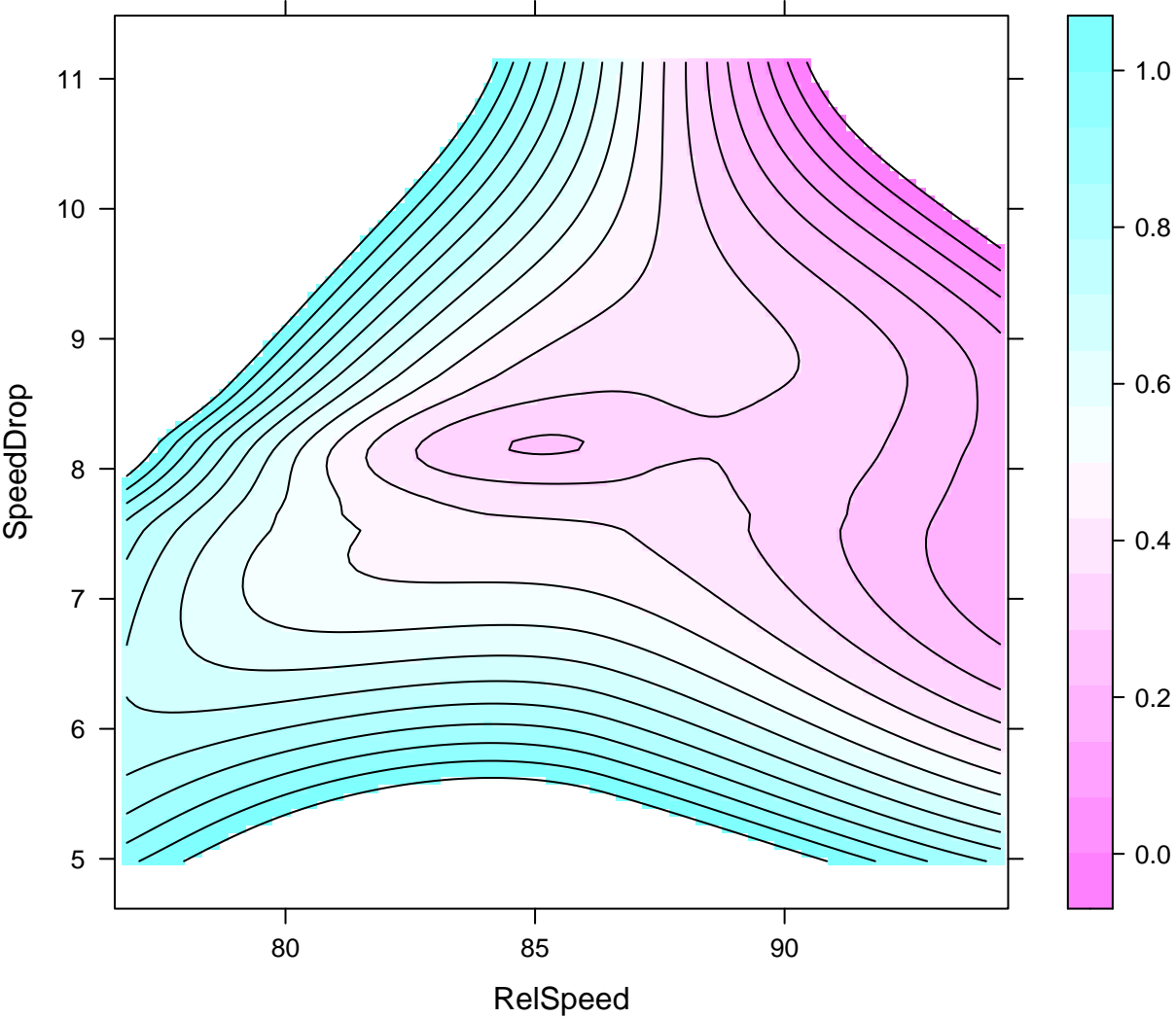
Ground Ball Sweet Spot for Lefty Fastball Movement



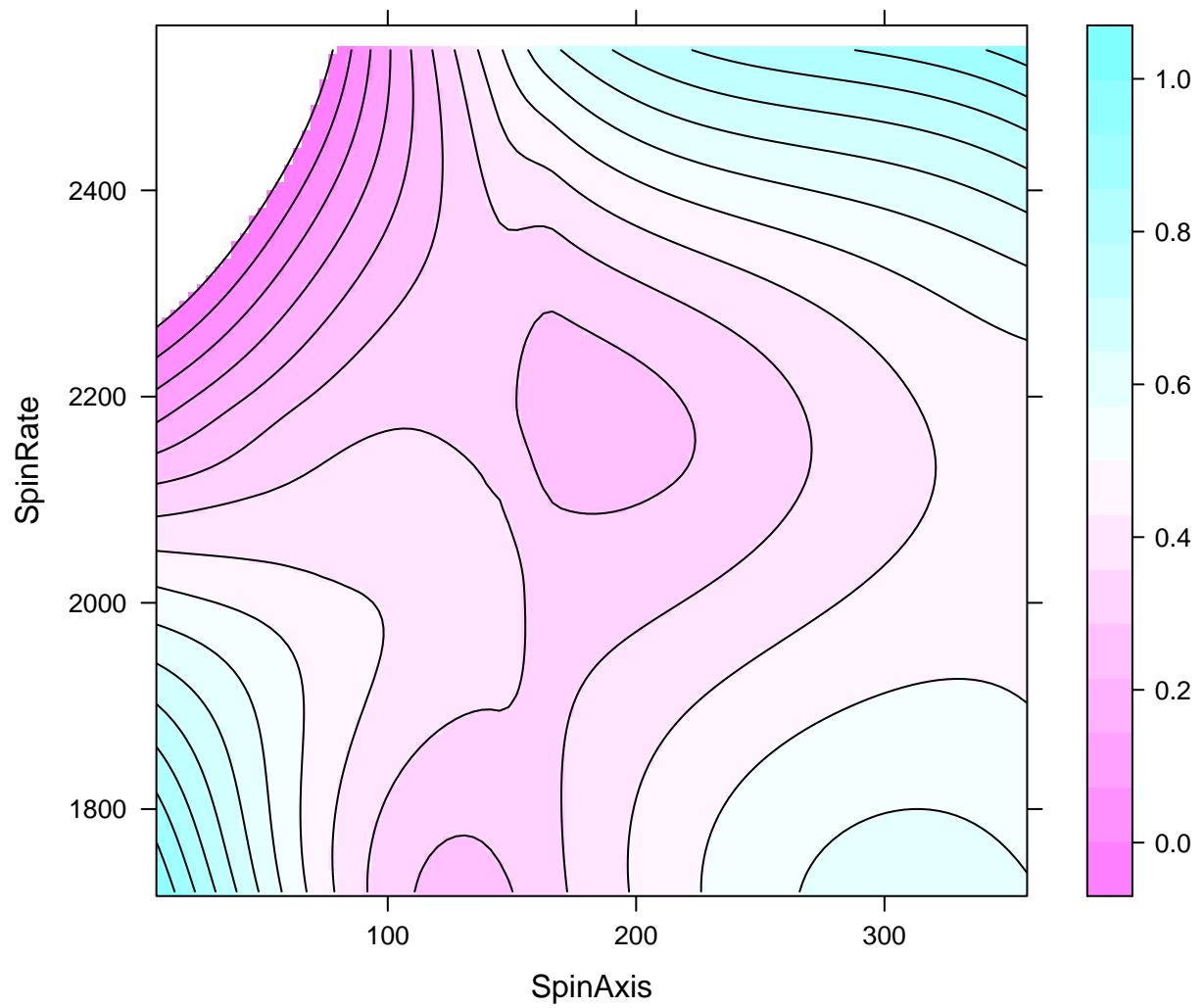
Ground Ball Sweet Spot for Lefty Fastball Break



Ground Ball Sweet Spot for Lefty Fastball Speed and Drop

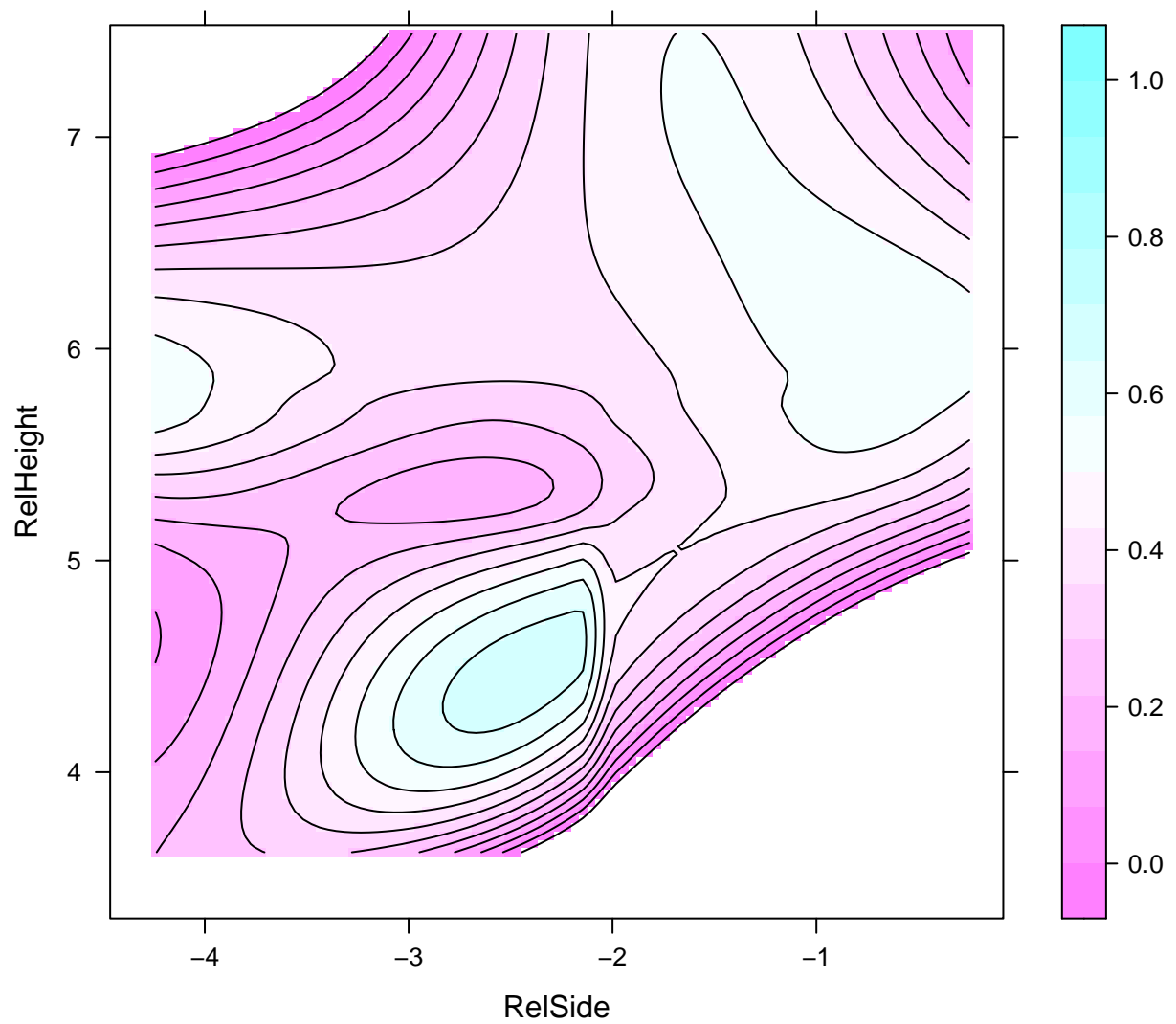


Ground Ball Sweet Spot for Lefty Fastball Spin

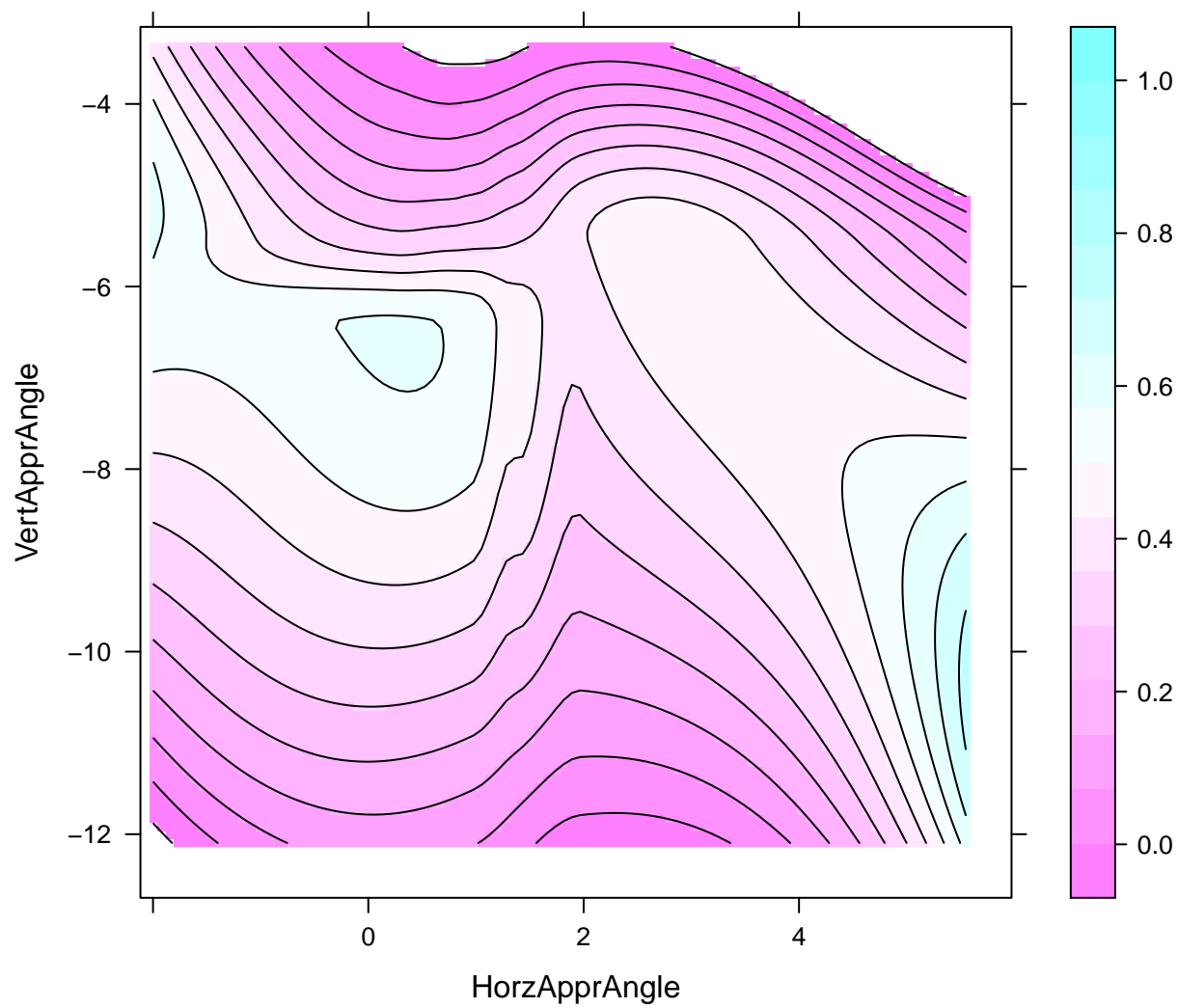


Left Handed Sinker

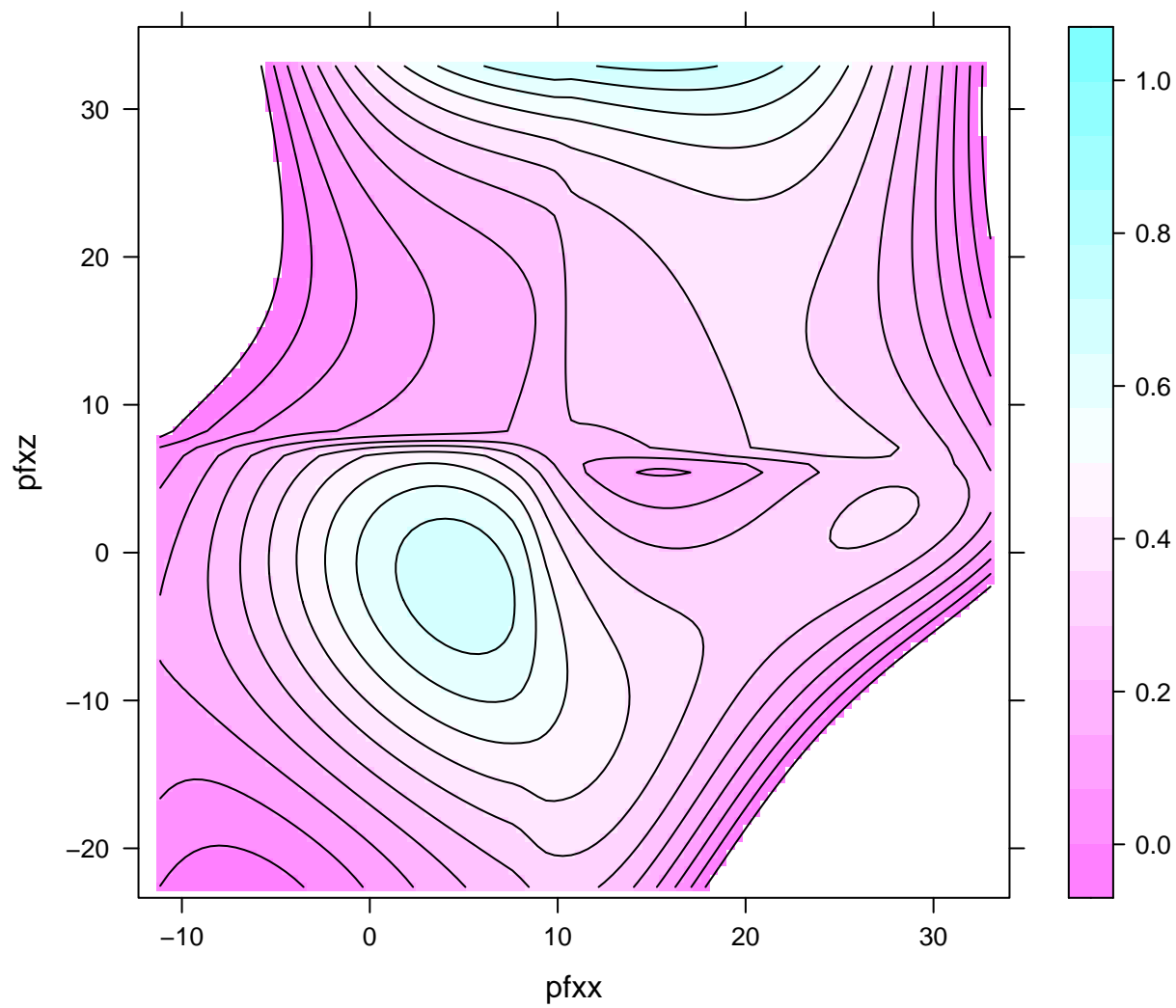
Ground Ball Sweet Spot for Lefty Sinker Release Coordinates



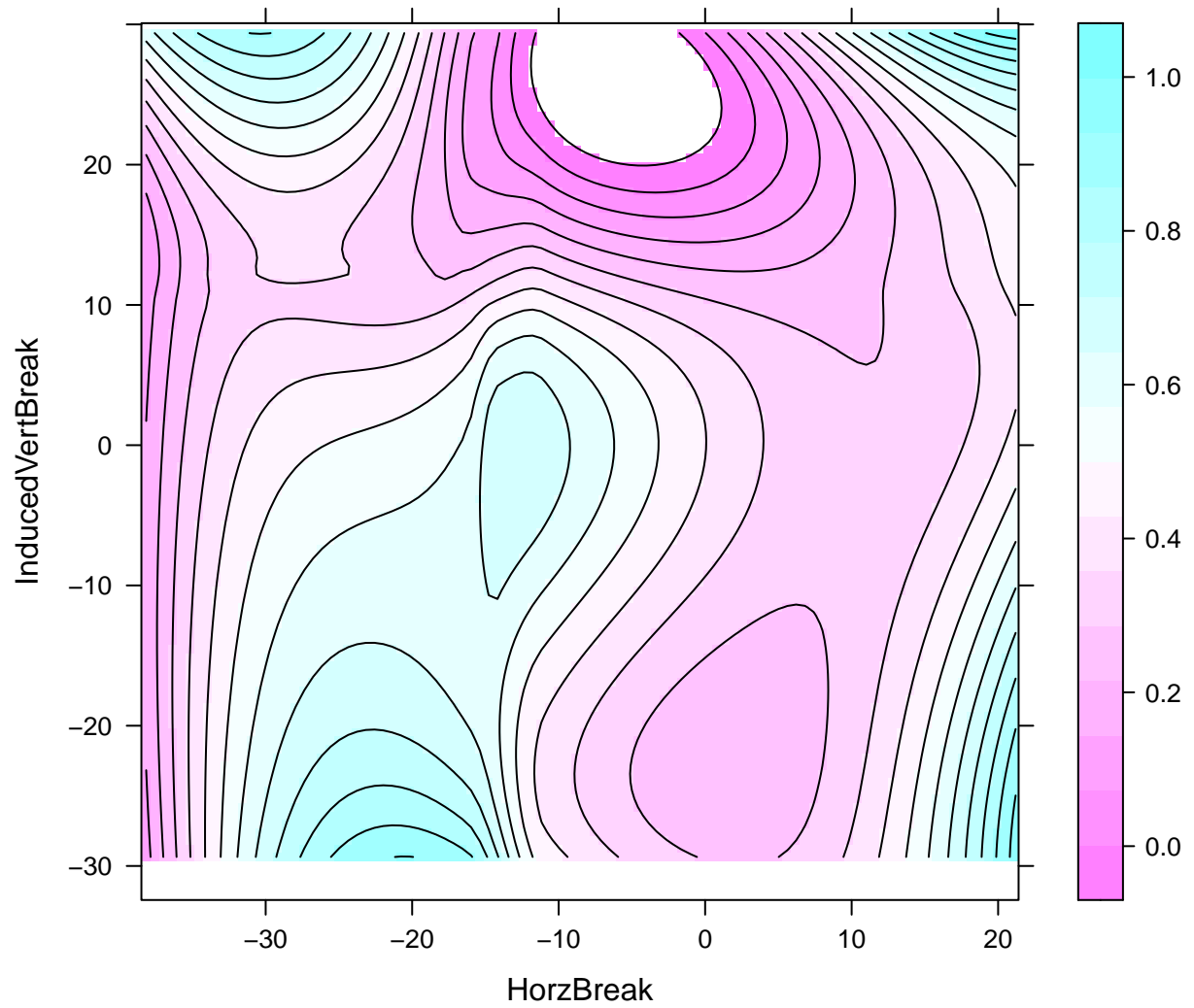
Ground Ball Sweet Spot for Lefty Sinker Approximate Angle



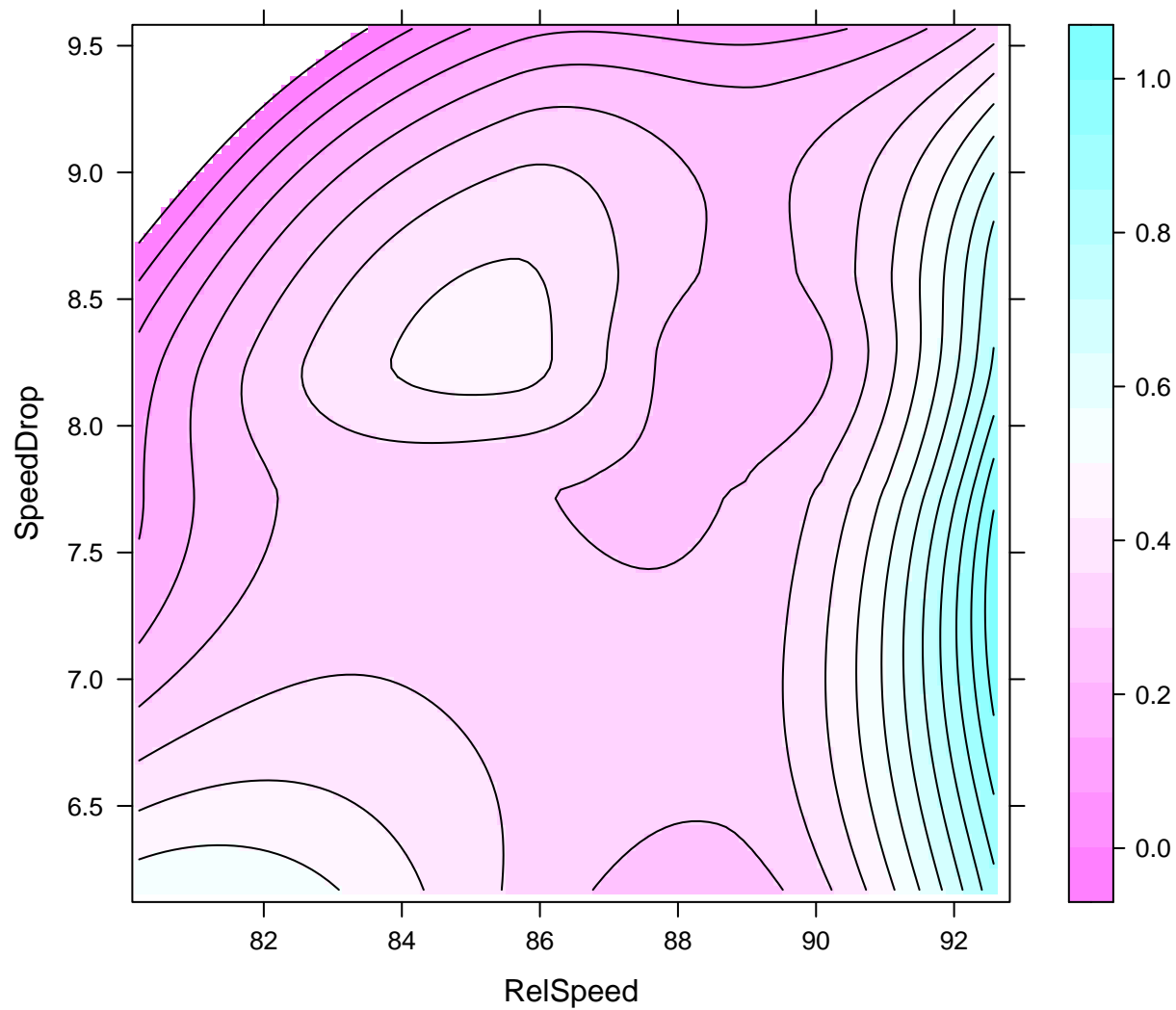
Ground Ball Sweet Spot for Lefty Sinker Movement



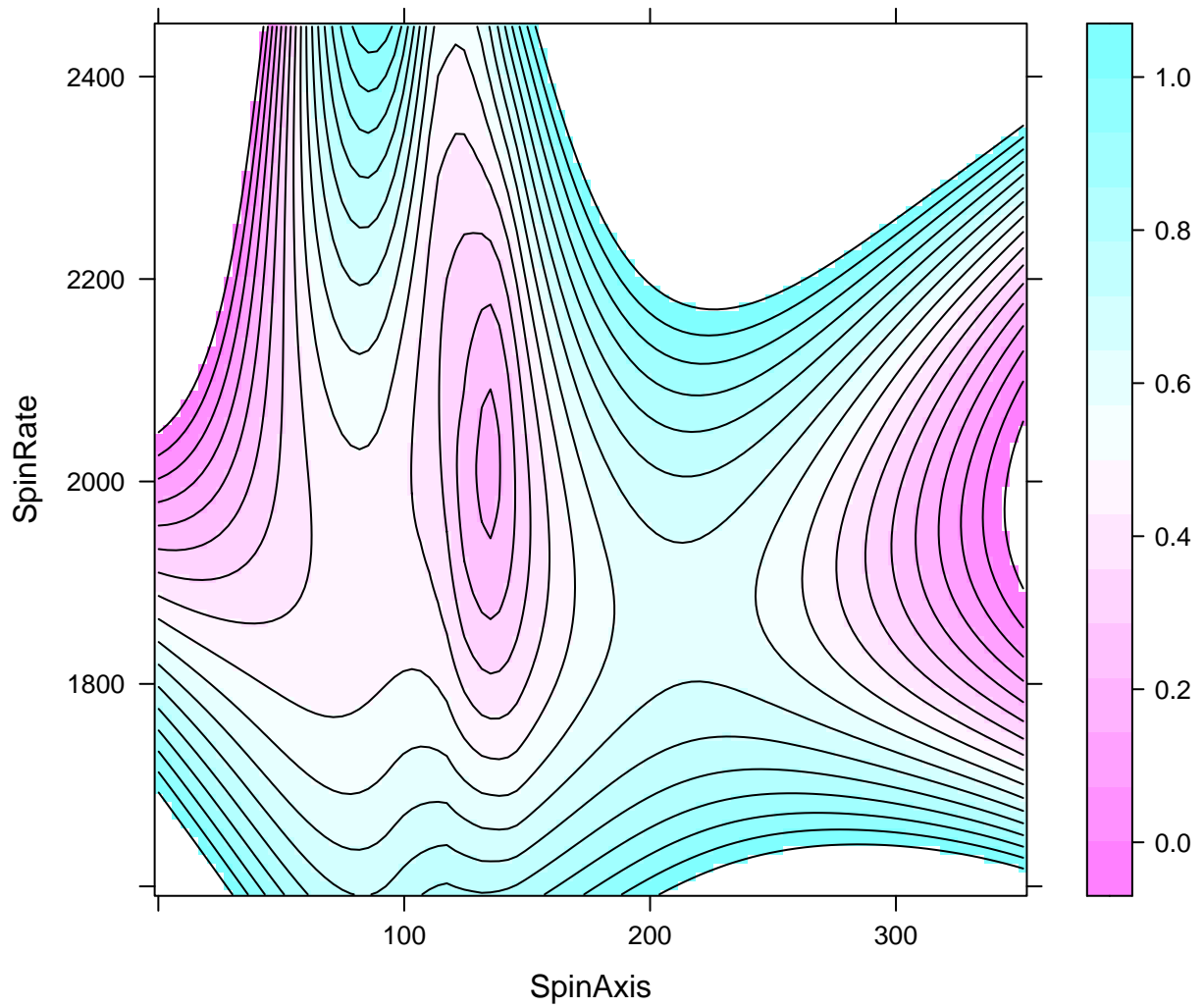
Ground Ball Sweet Spot for Lefty Sinker Break



Ground Ball Sweet Spot for Lefty Sinker Speed and Drop

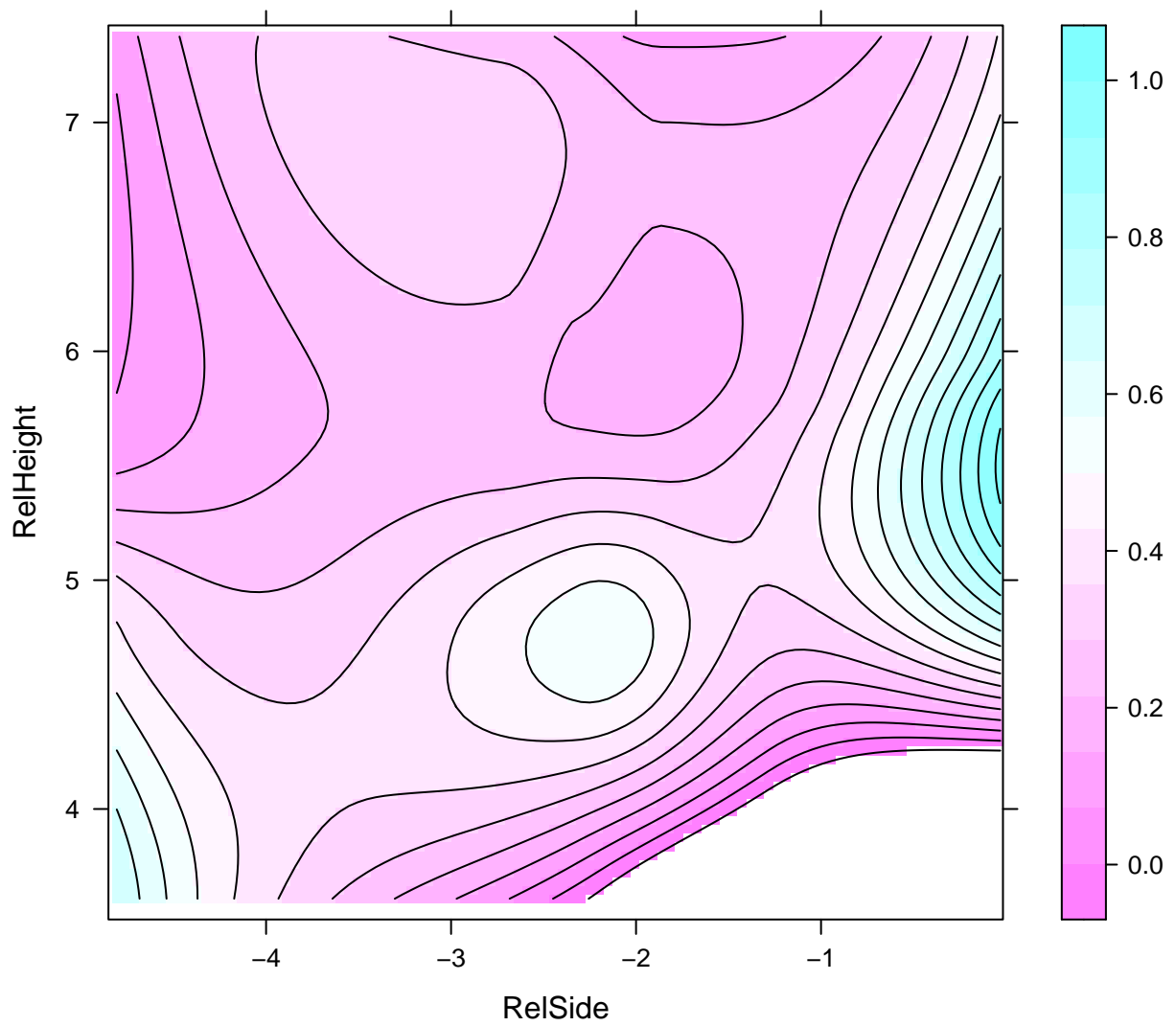


Ground Ball Sweet Spot for Lefty Sinker Spin

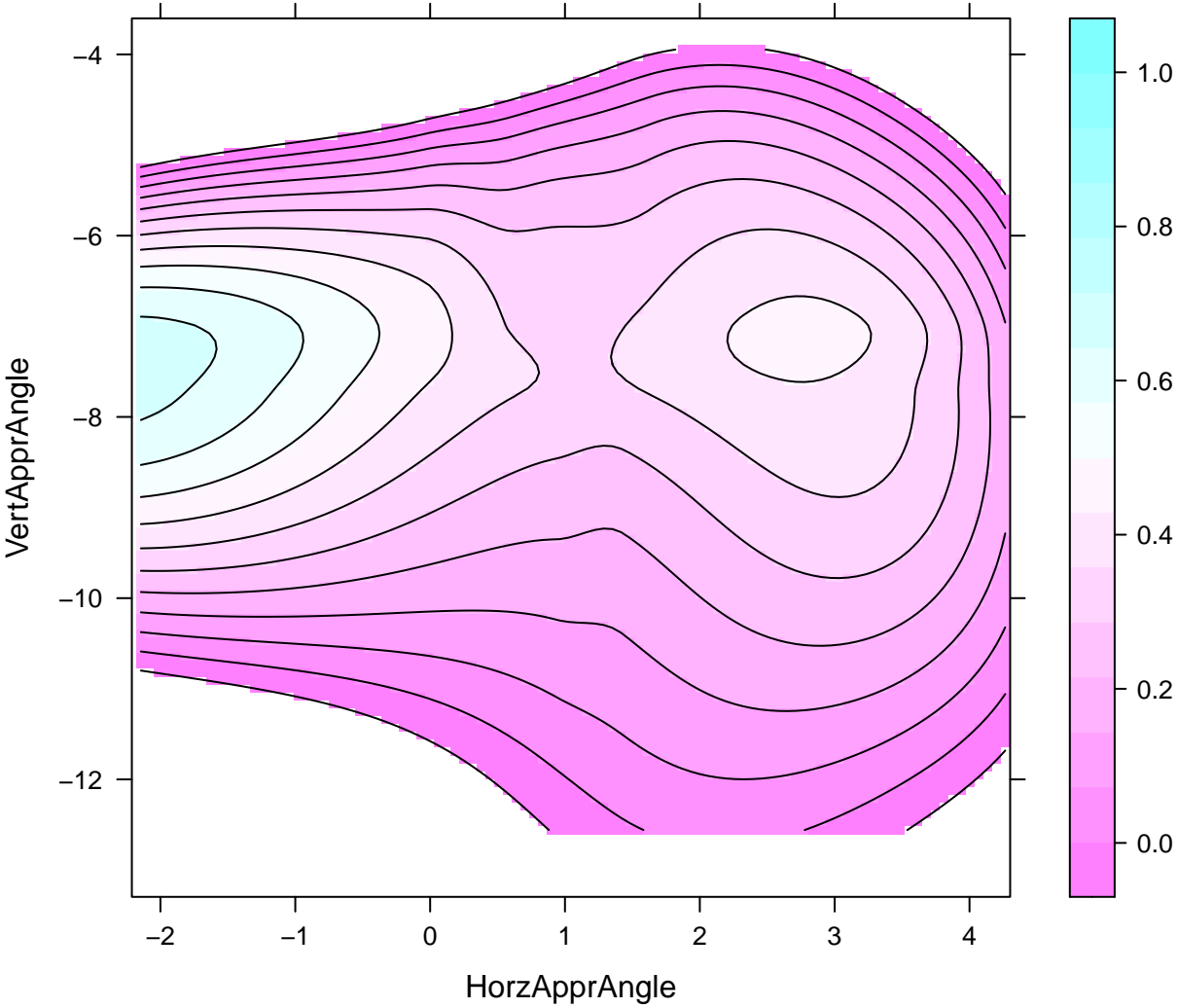


Left Handed Changeup

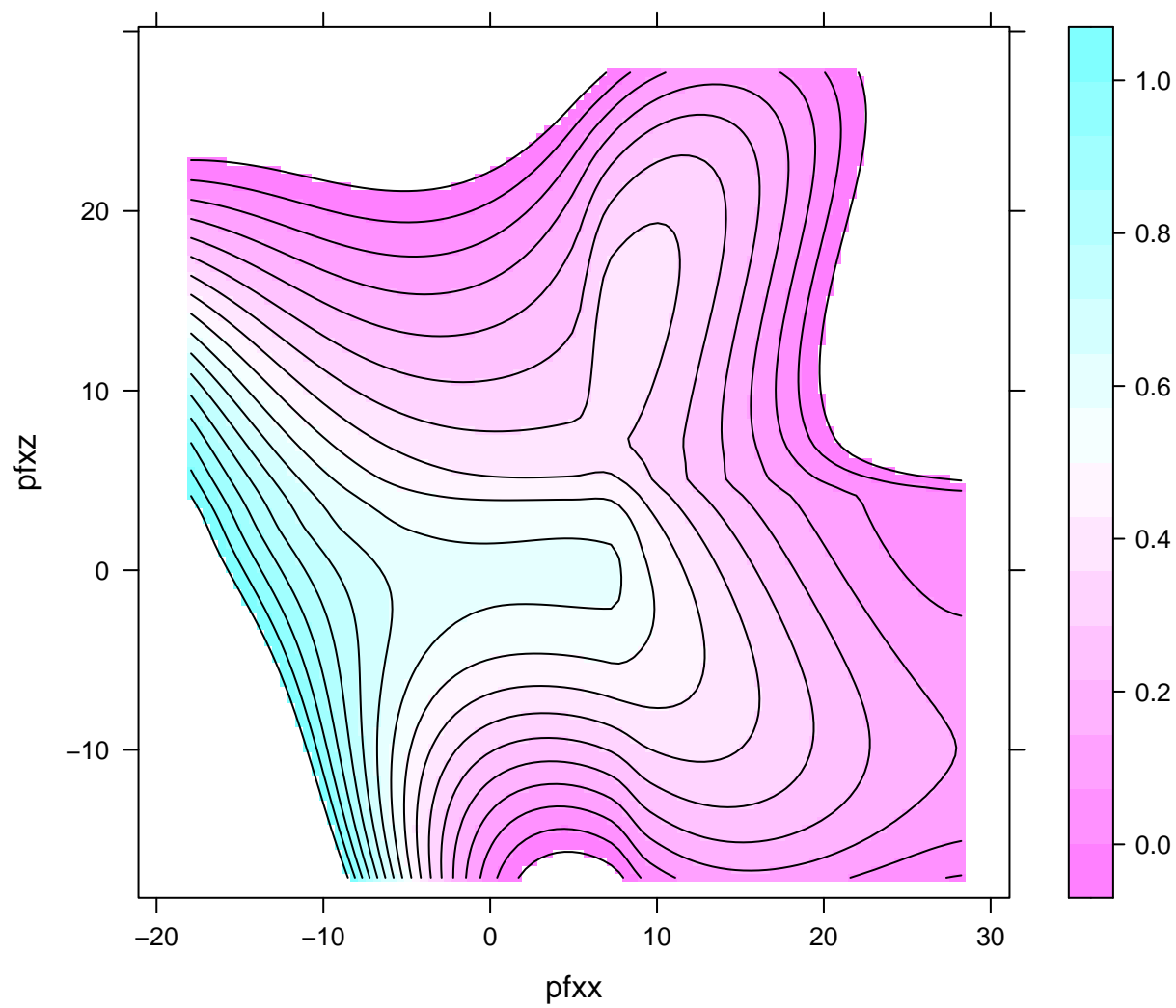
Ground Ball Sweet Spot for Lefty Changeup Release Coordinates



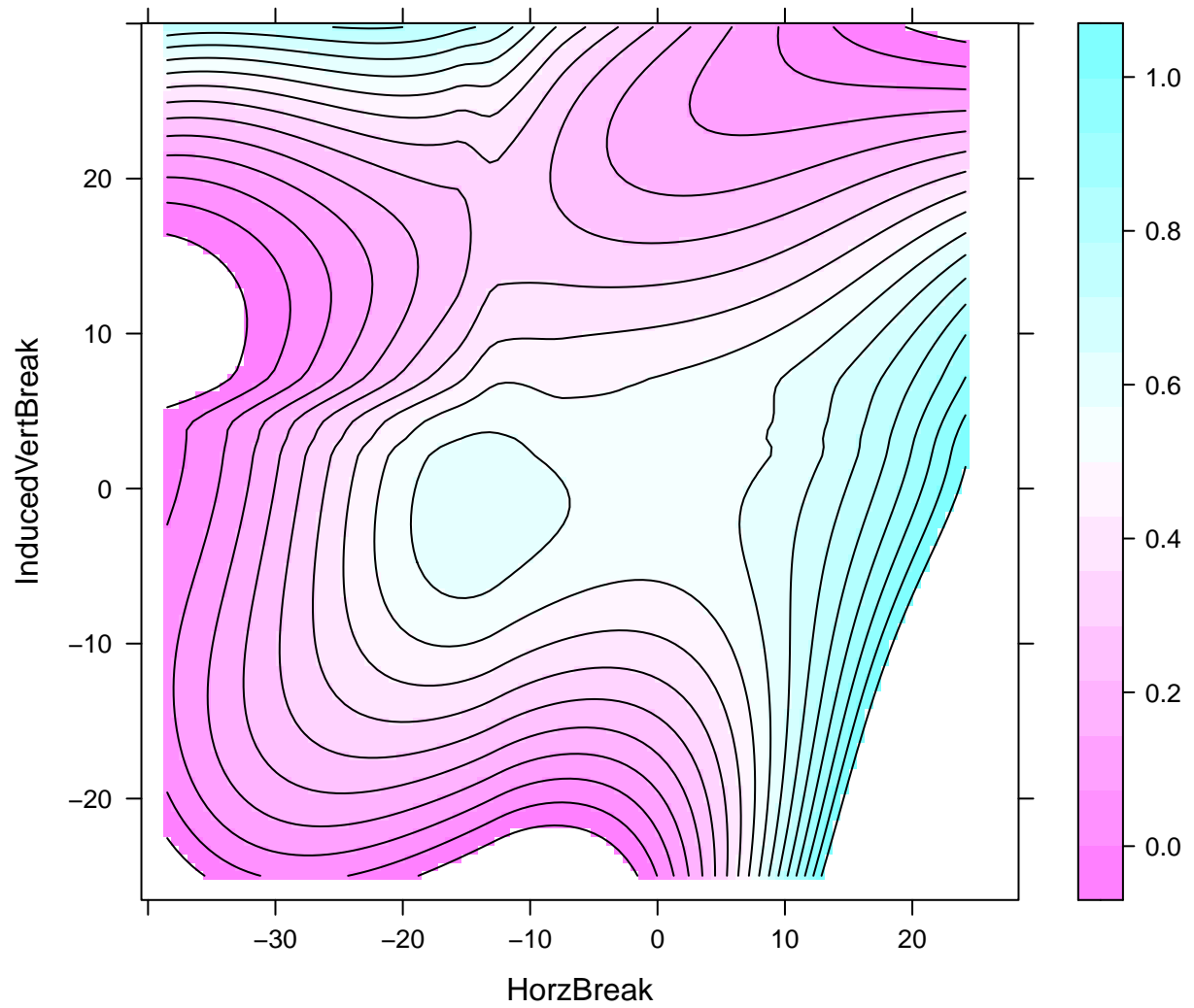
Ground Ball Sweet Spot for Lefty Changeup Approximate Angle



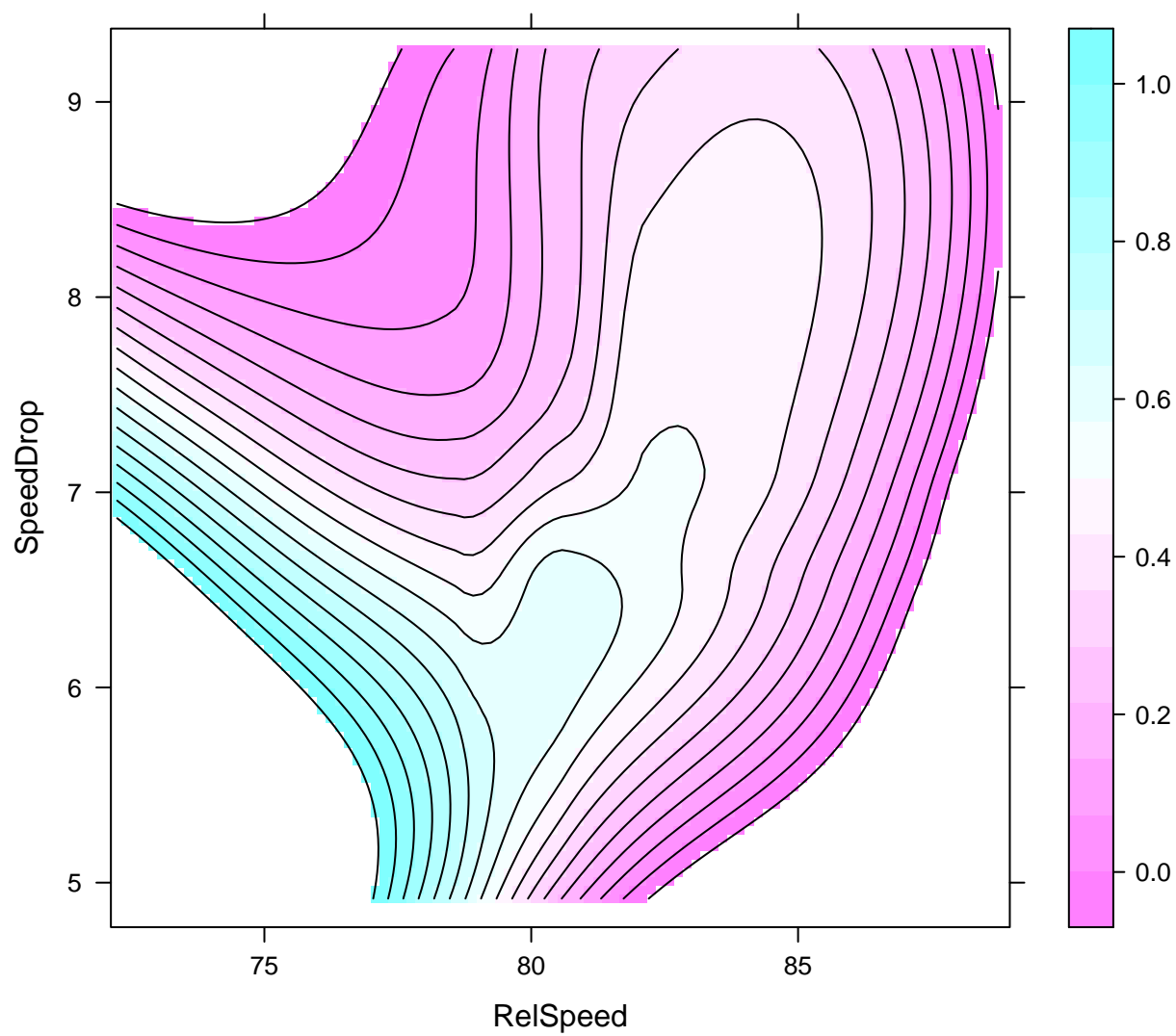
Ground Ball Sweet Spot for Lefty Changeup Movement



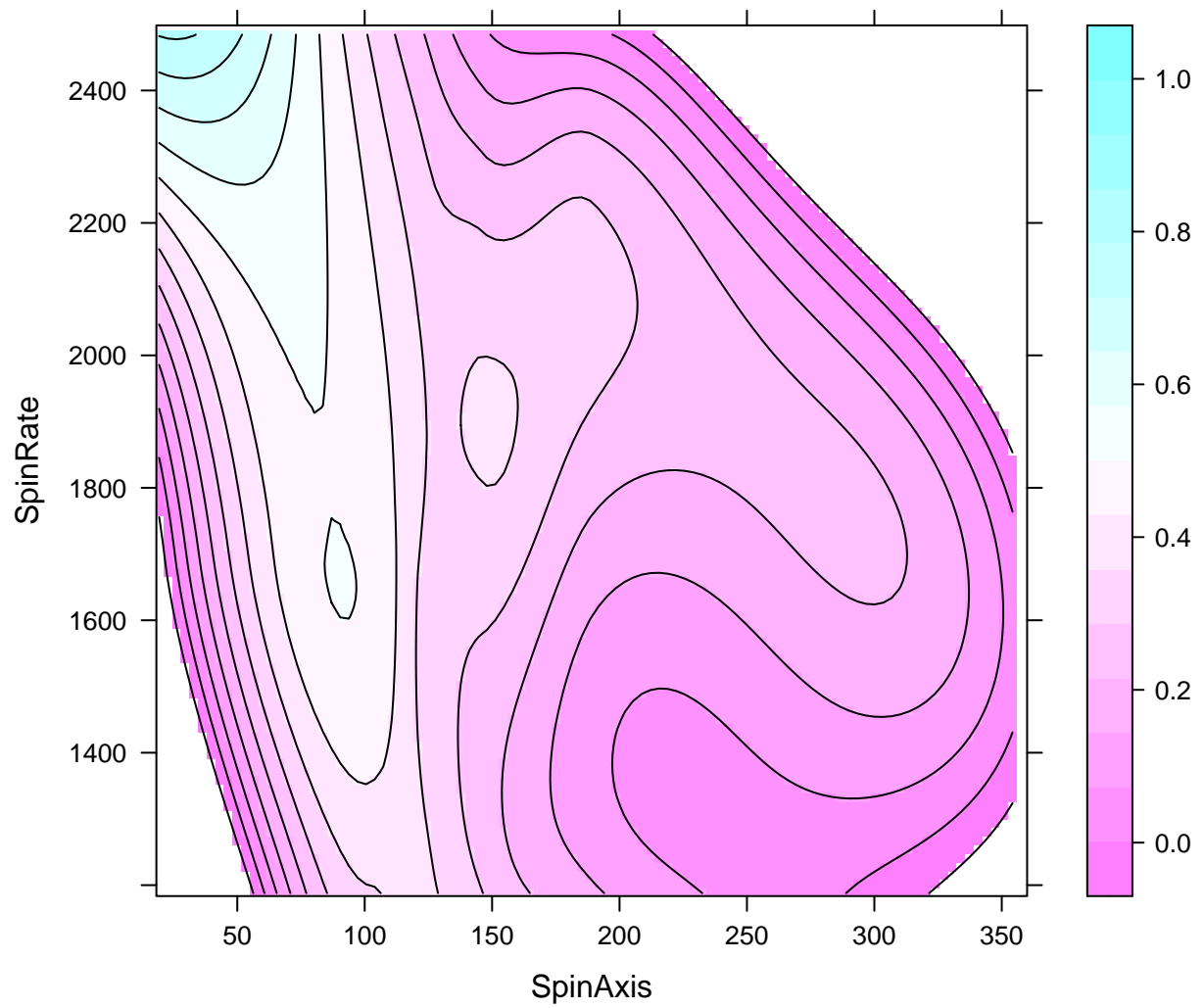
Ground Ball Sweet Spot for Lefty Changeup Break



Ground Ball Sweet Spot for Lefty Changeup Speed and Drop

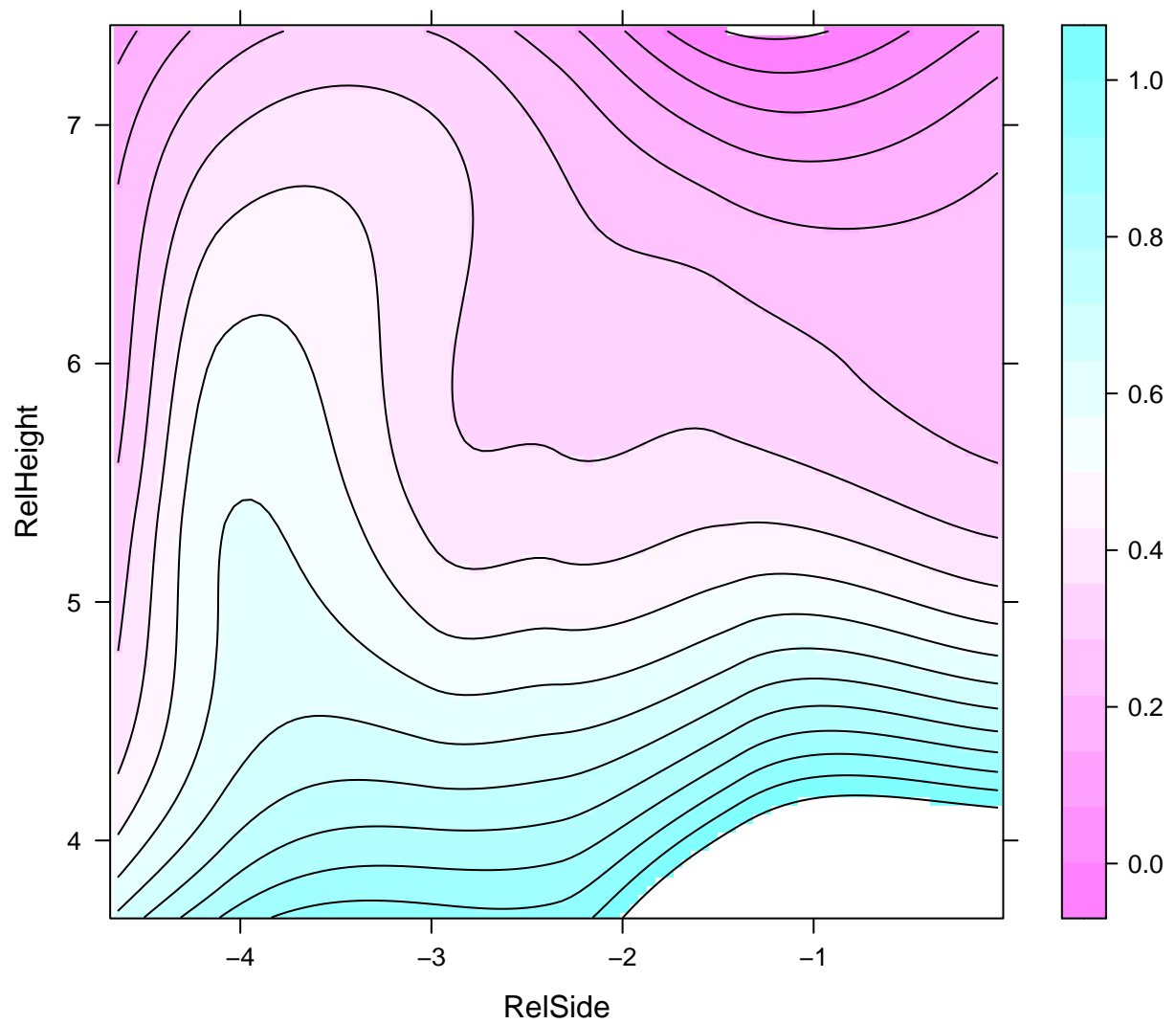


Ground Ball Sweet Spot for Lefty Changeup Spin

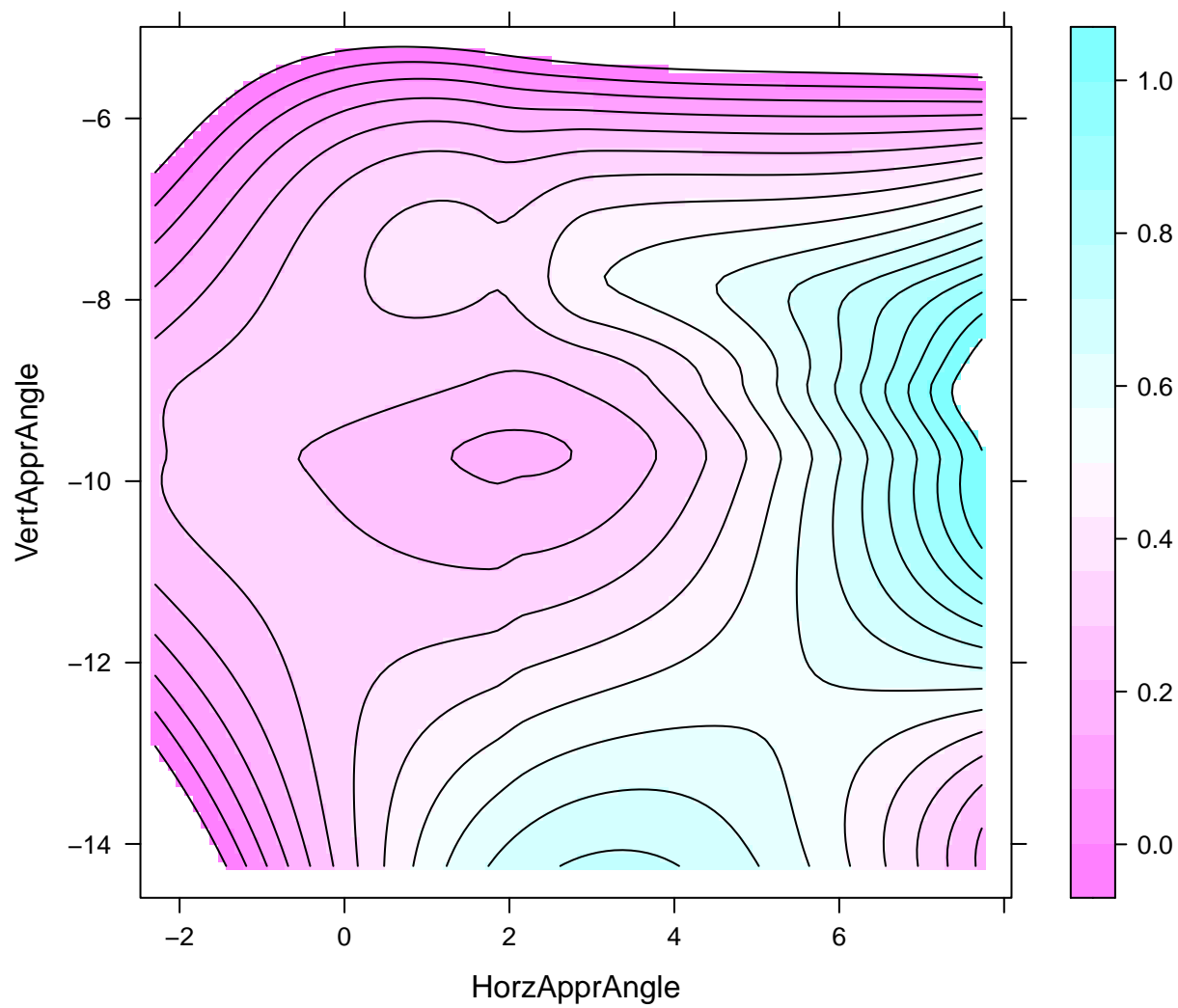


Left Handed Curveball

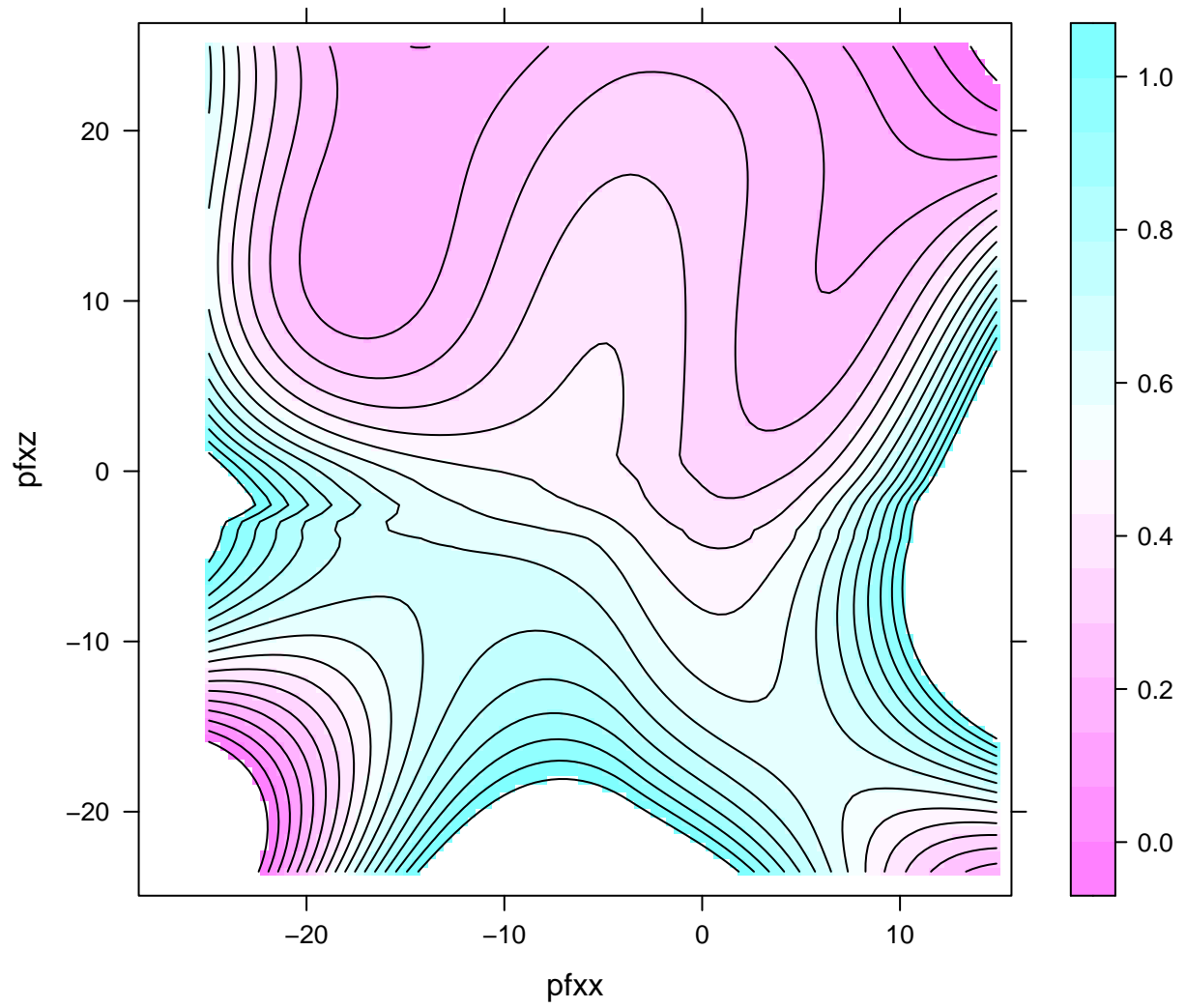
Ground Ball Sweet Spot for Lefty Curveball Release Coordinates



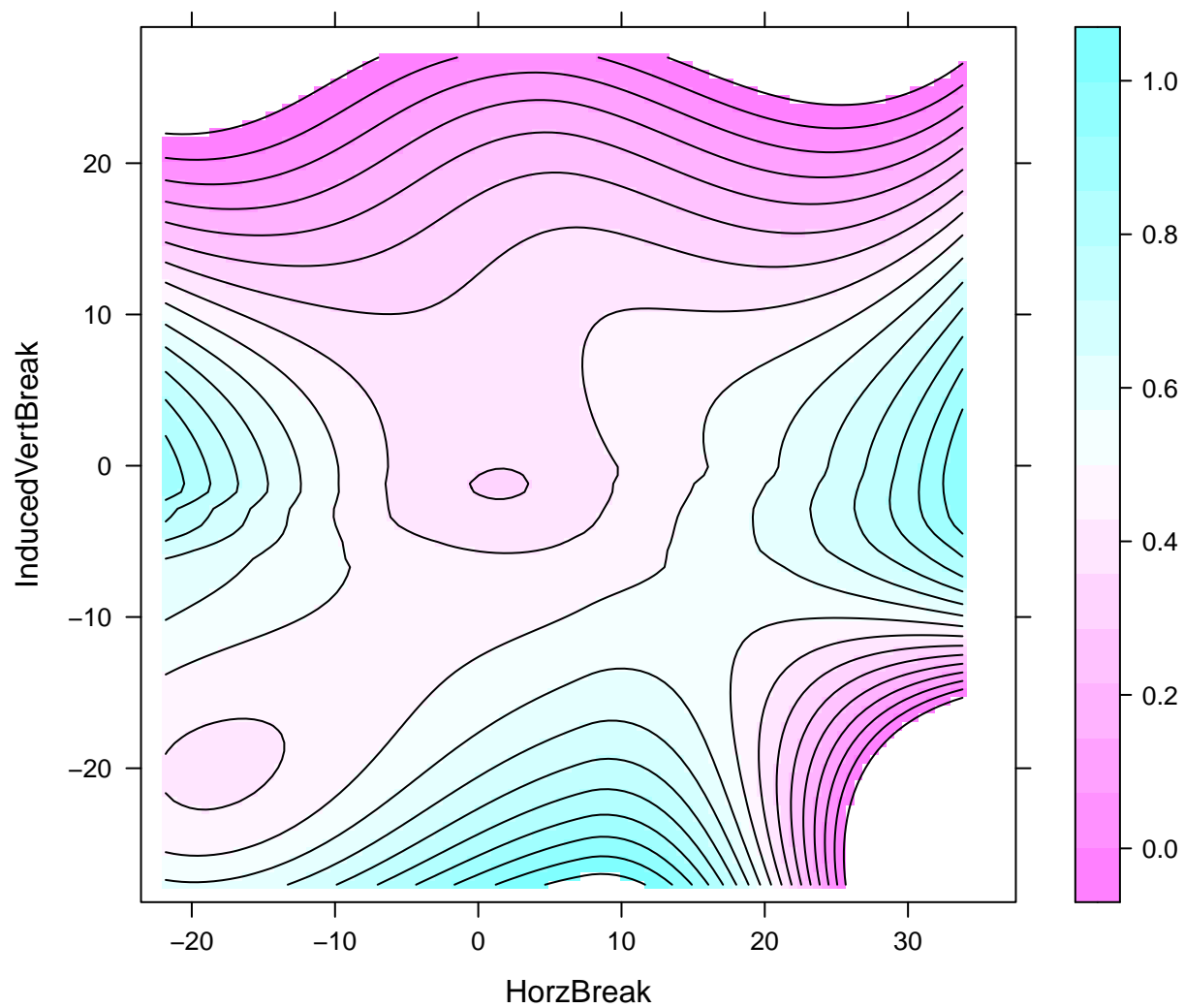
Ground Ball Sweet Spot for Lefty Curveball Approximate Angle



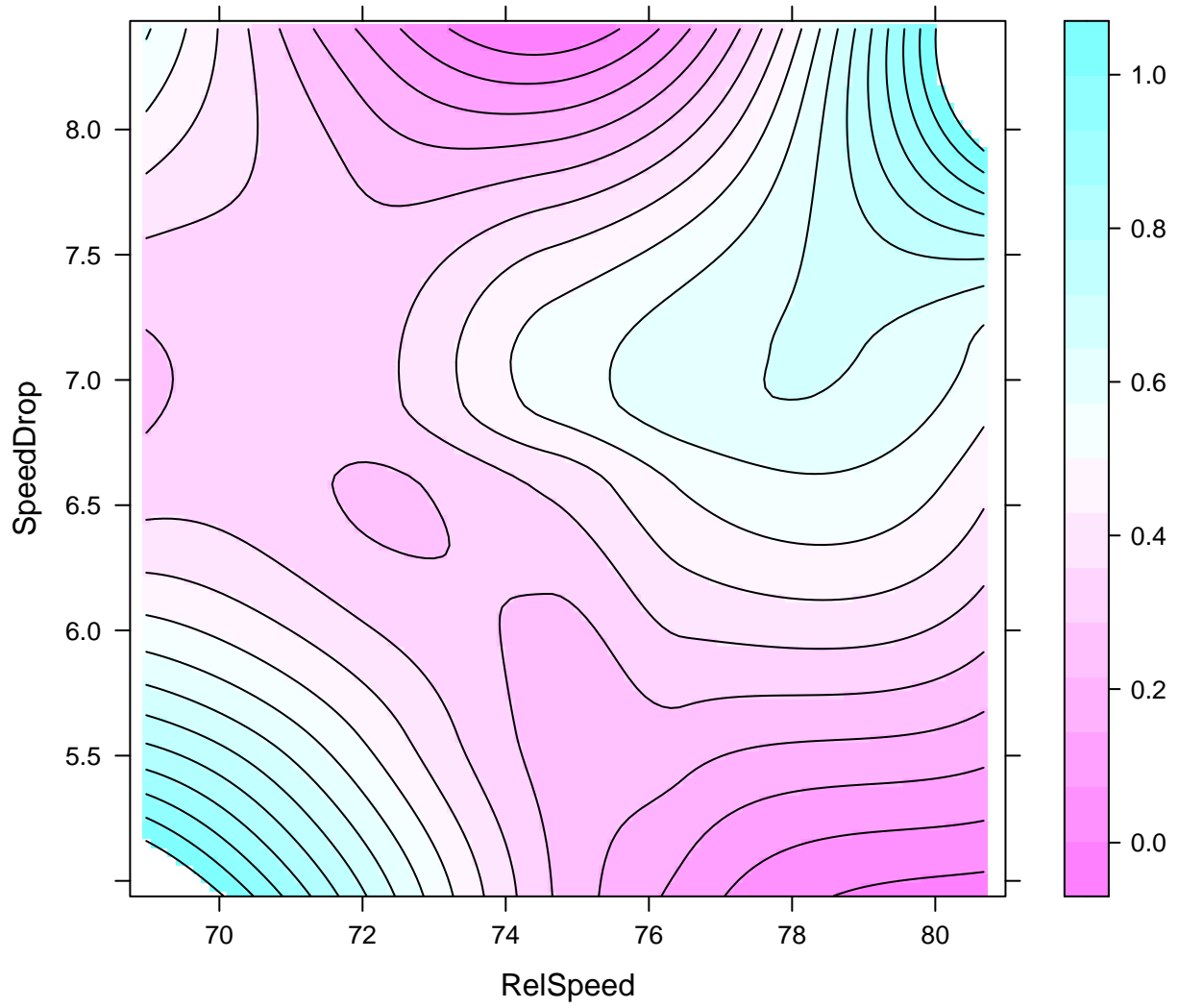
Ground Ball Sweet Spot for Lefty Curveball Movement



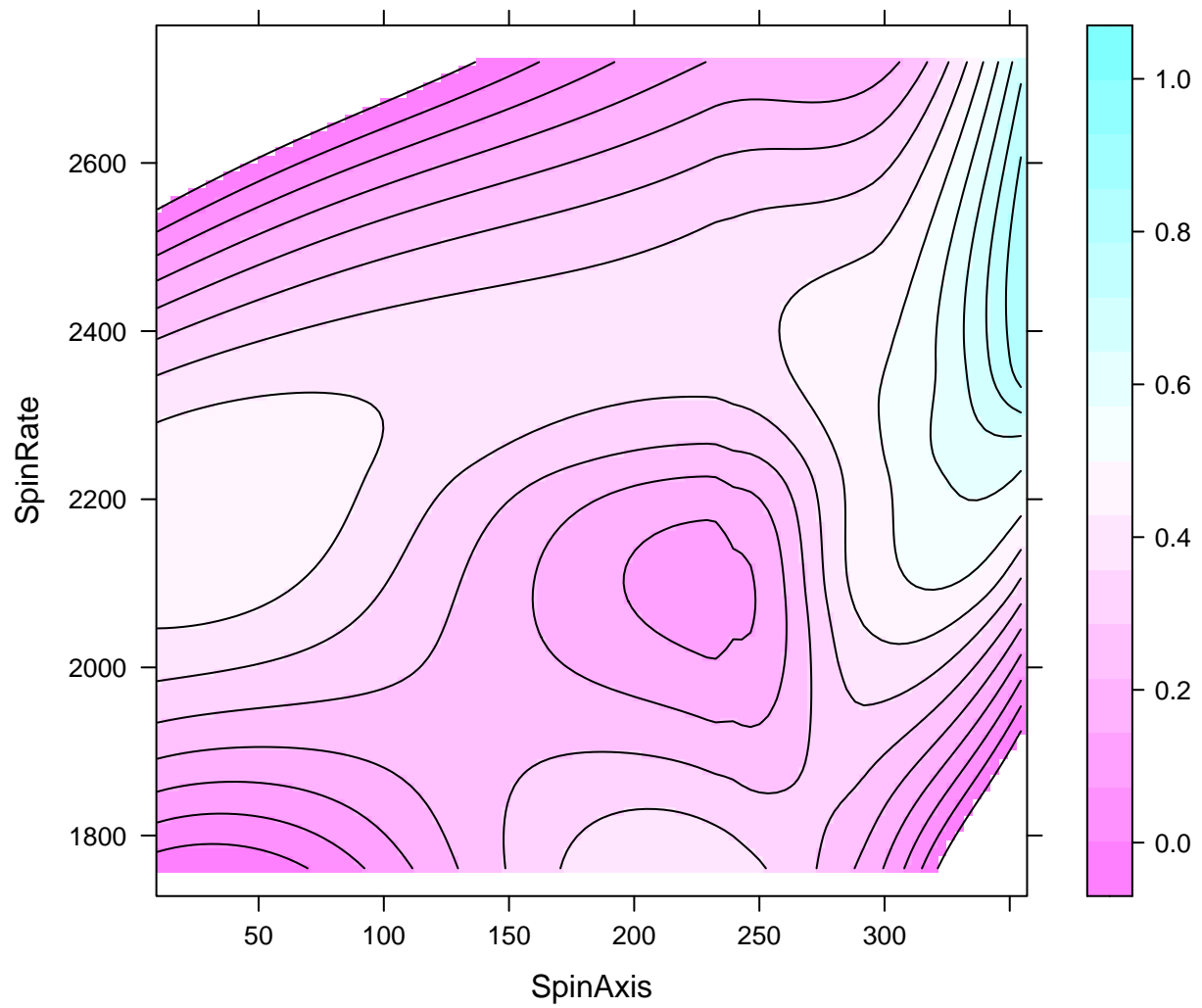
Ground Ball Sweet Spot for Lefty Curveball Break



Ground Ball Sweet Spot for Lefty Curveball Speed and Drop

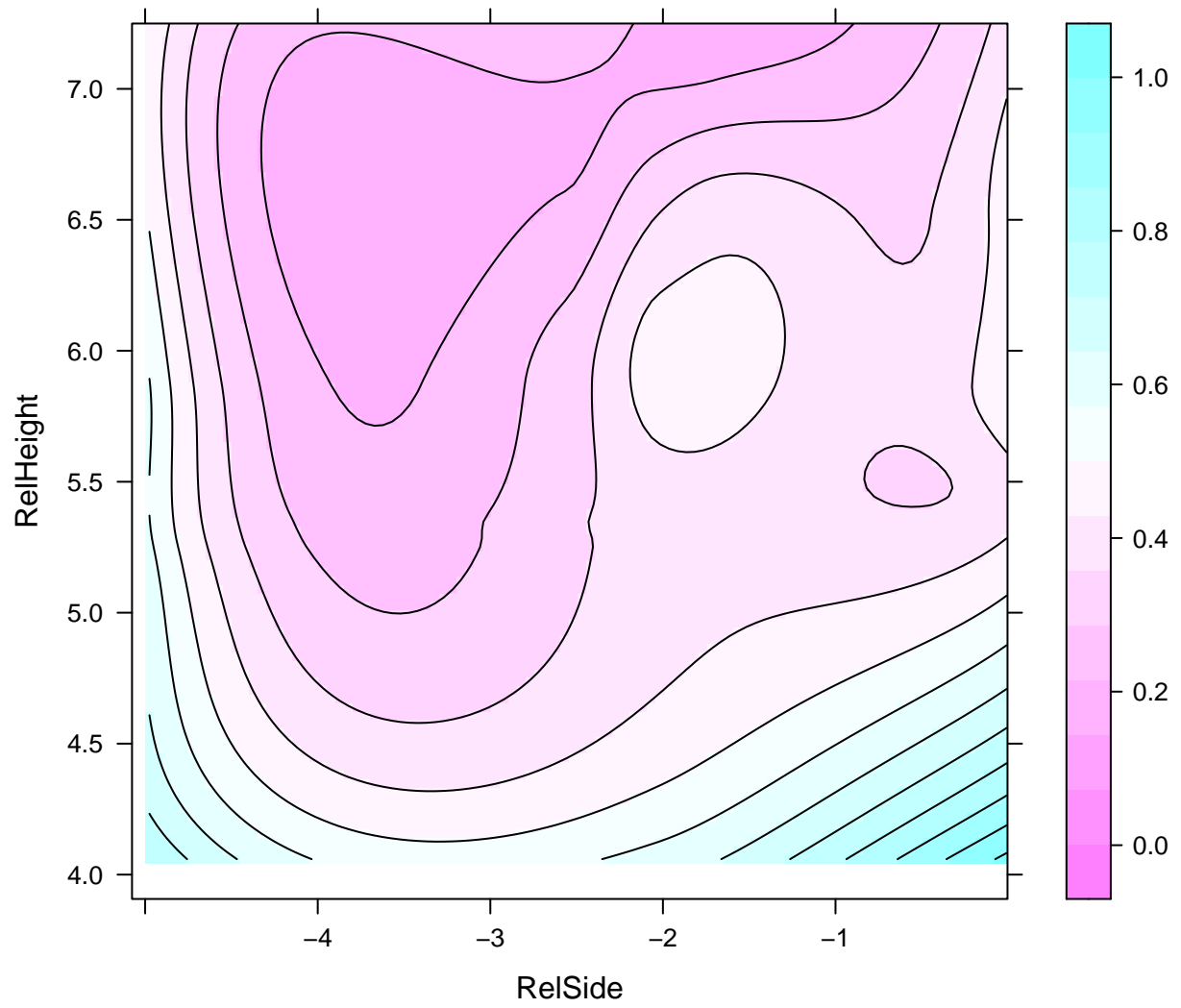


Ground Ball Sweet Spot for Lefty Curveball Spin

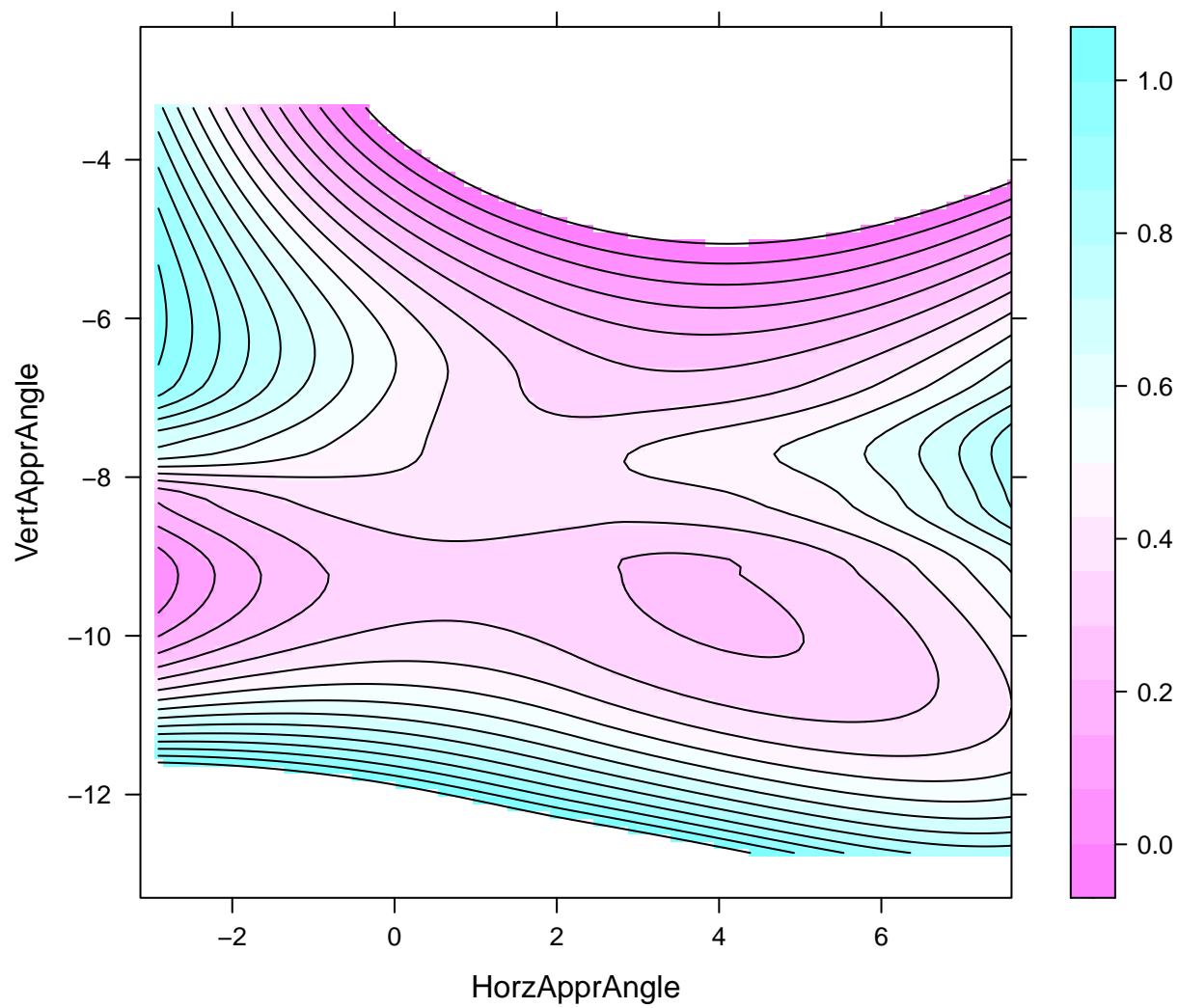


Left Handed Slider

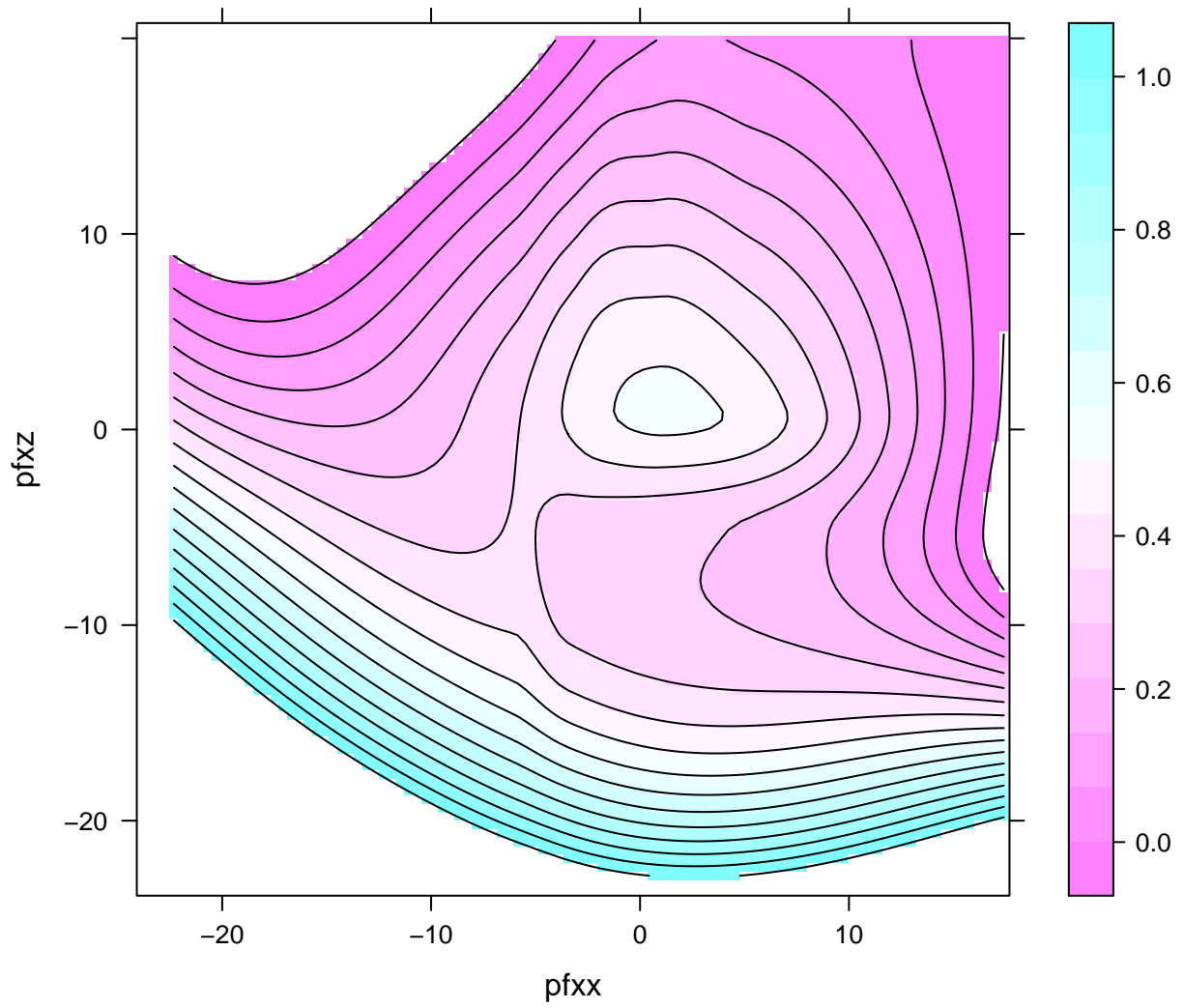
Ground Ball Sweet Spot for Lefty Slider Release Coordinates



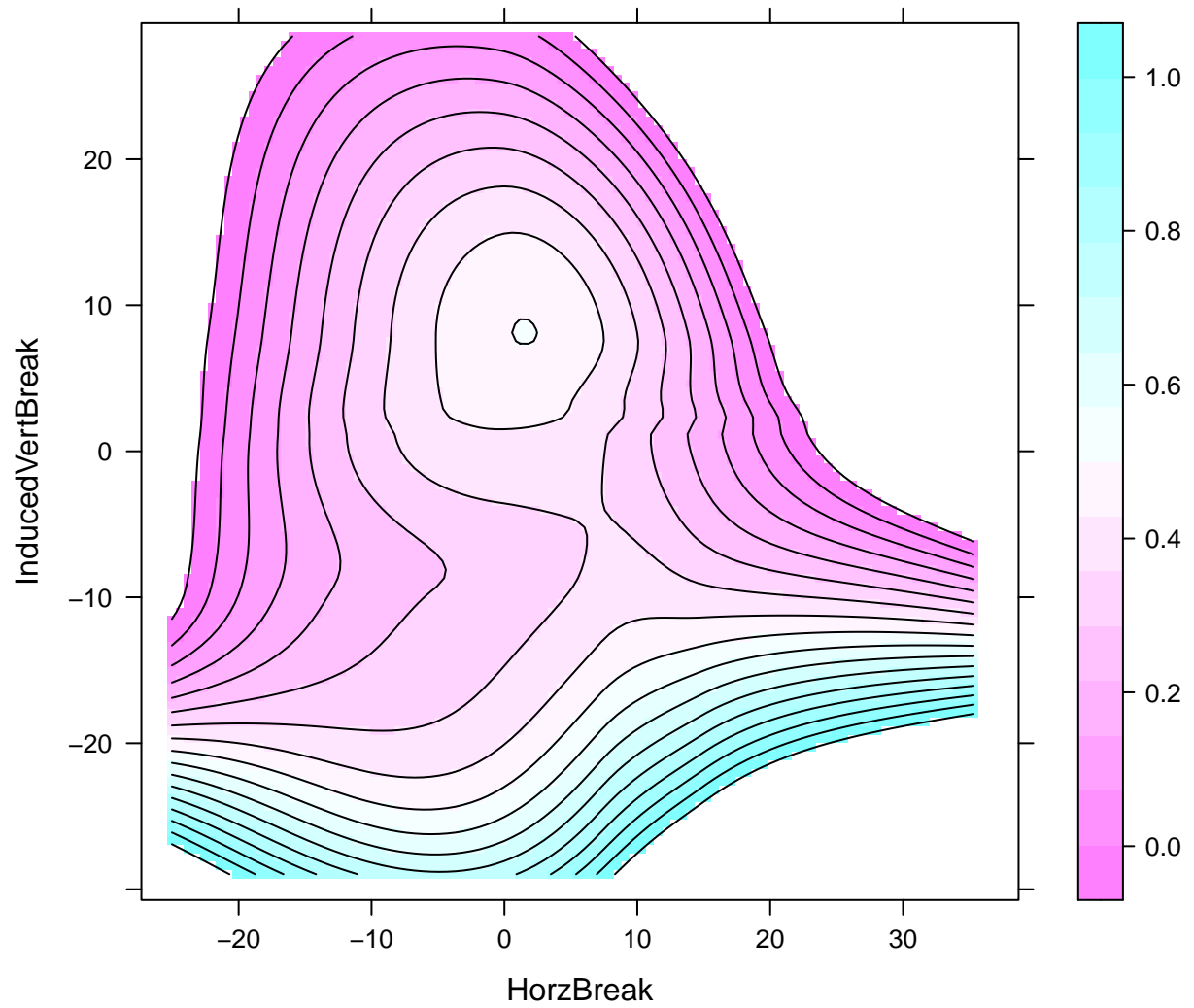
Ground Ball Sweet Spot for Lefty Slider Approximate Angle



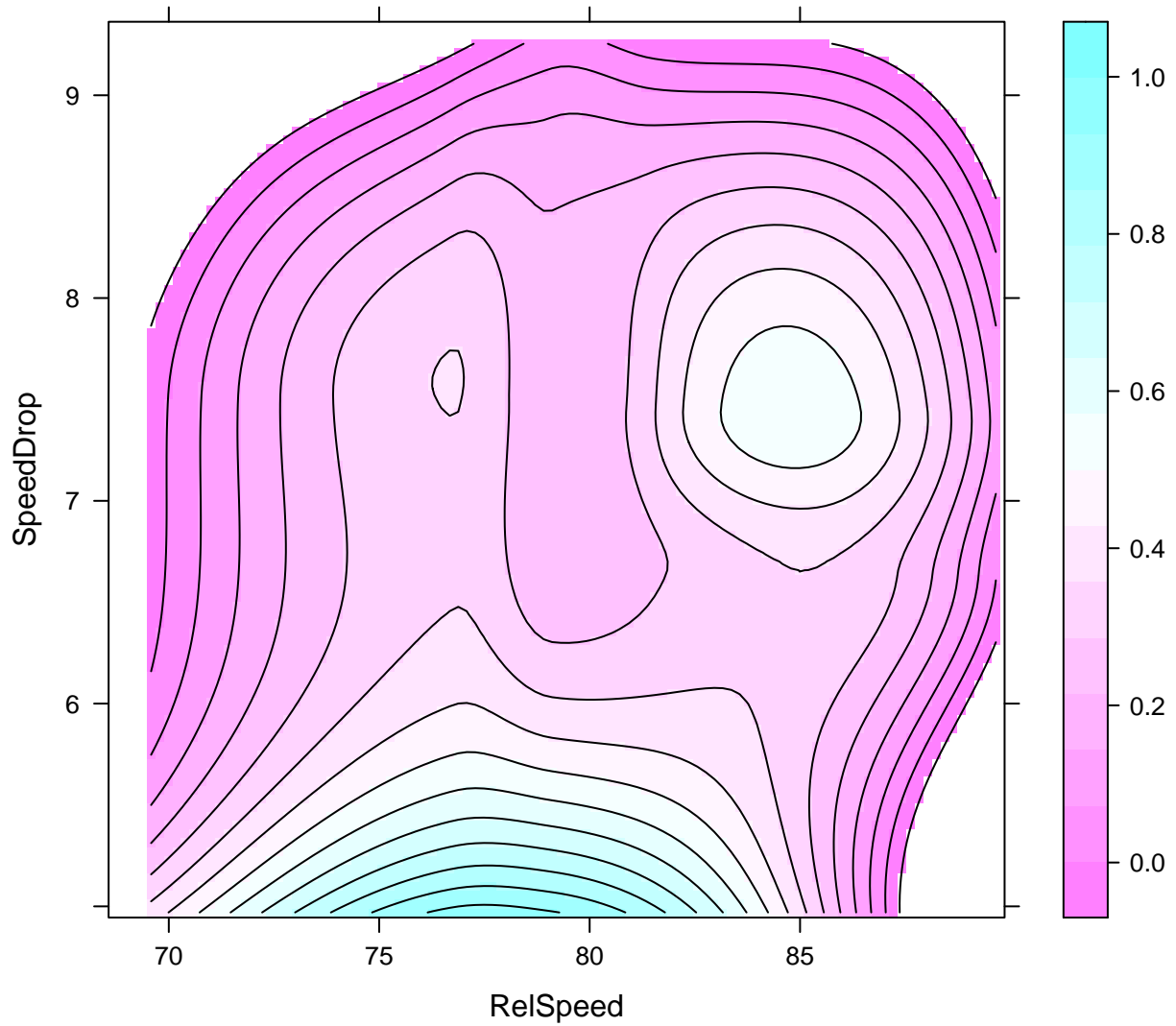
Ground Ball Sweet Spot for Lefty Slider Movement



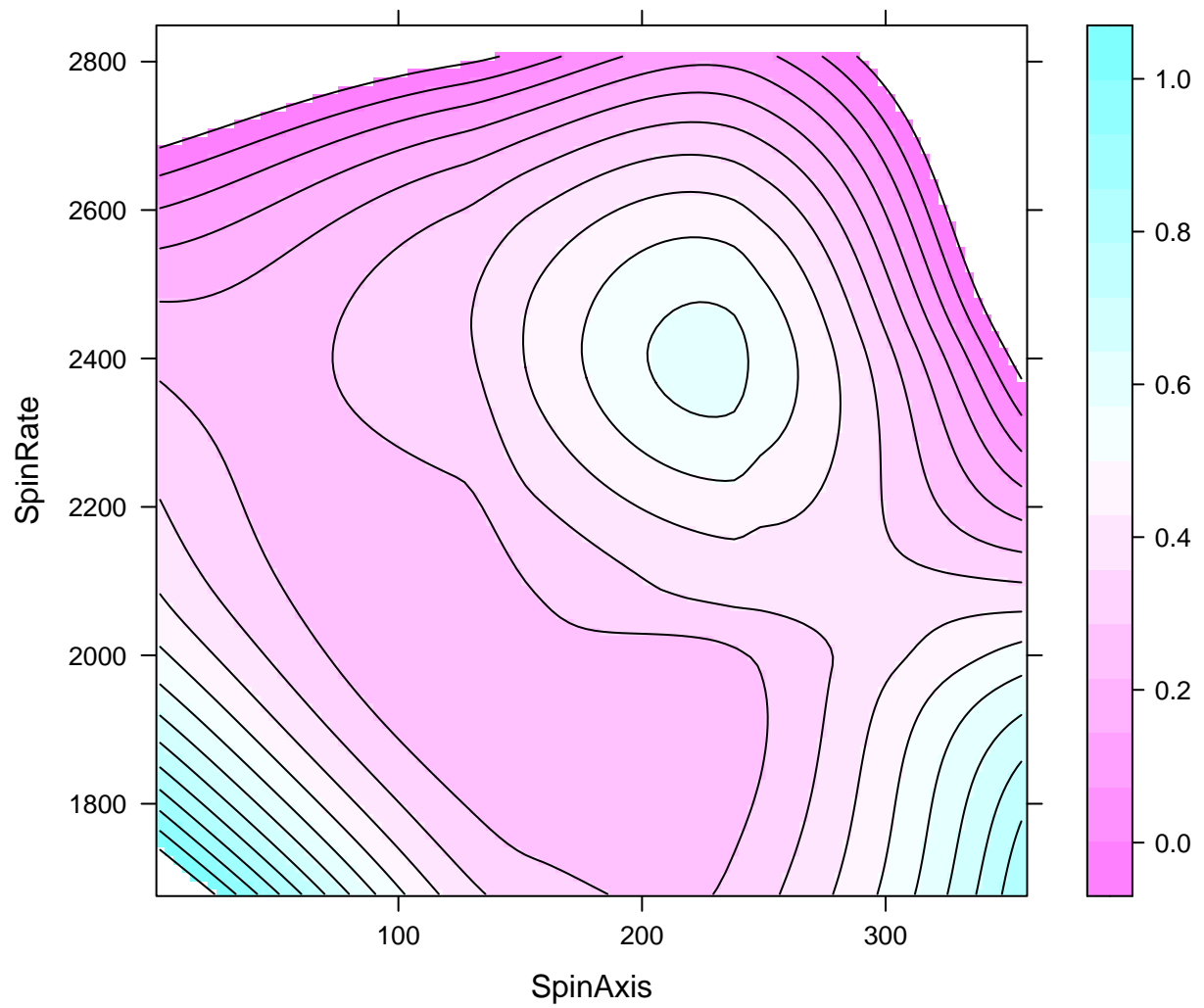
Ground Ball Sweet Spot for Lefty Slider Break



Ground Ball Sweet Spot for Lefty Slider Speed and Drop



Ground Ball Sweet Spot for Lefty Slider Spin



Conclusion

To wrap this up, take these contour maps with a grain of salt but understand the general directions that push the combinations of these 14 variables to maximize the ground ball percentage of opponent batters.

Questions: djt5@illinois.edu