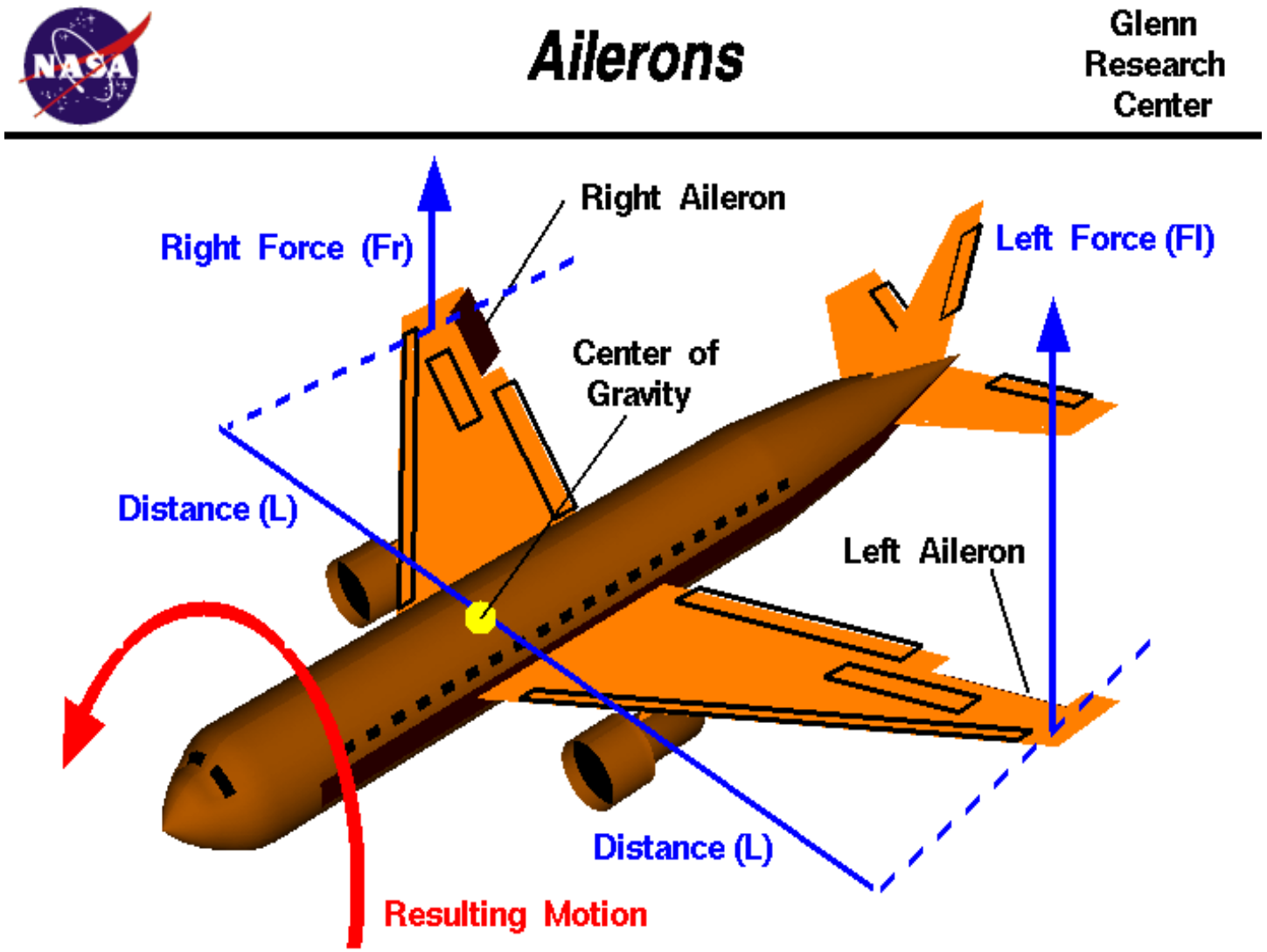



# Ailerons

MICHAEL AYEDUN

ERIK CARRION

https://github.com/itikn/9890_Project

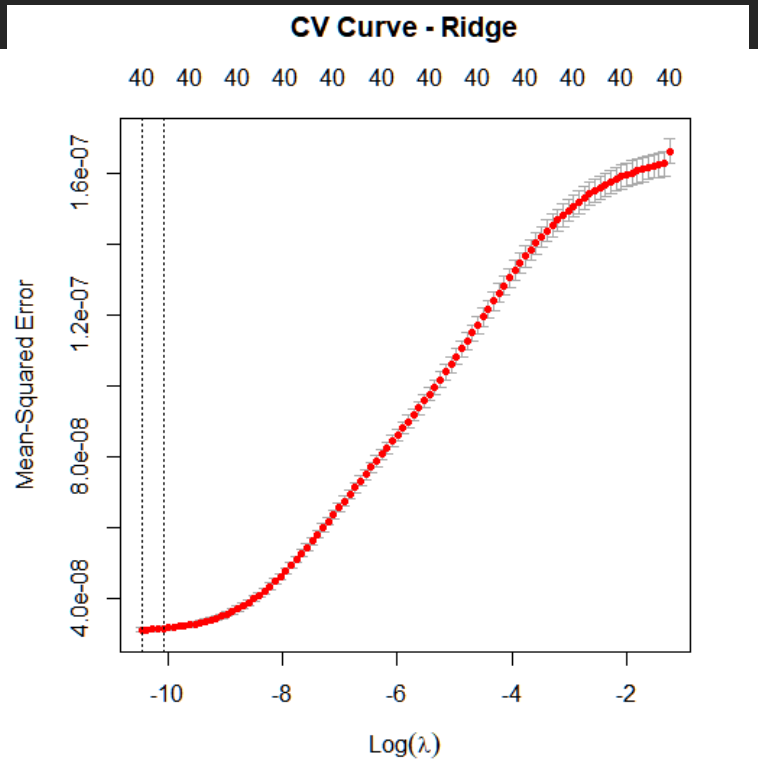
# Data Description

Goal: Predict the control action of the aircraft's ailerons - reverse engineer human control skills to serve as a model for an auto-pilot system

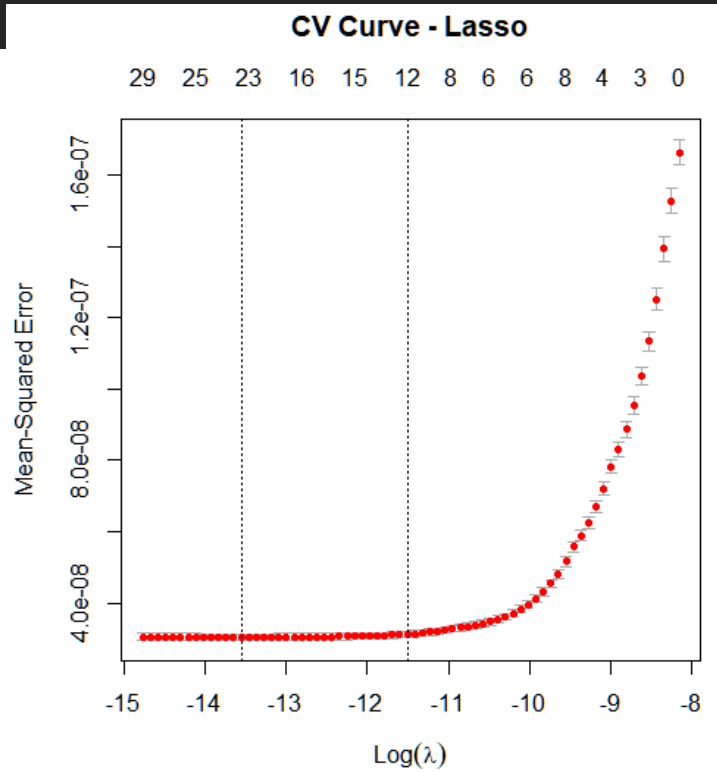
Data Set:

- 13,750 observations
- 40 Predictors – represent the state of the aircraft
- No missing values
- No categorical variables

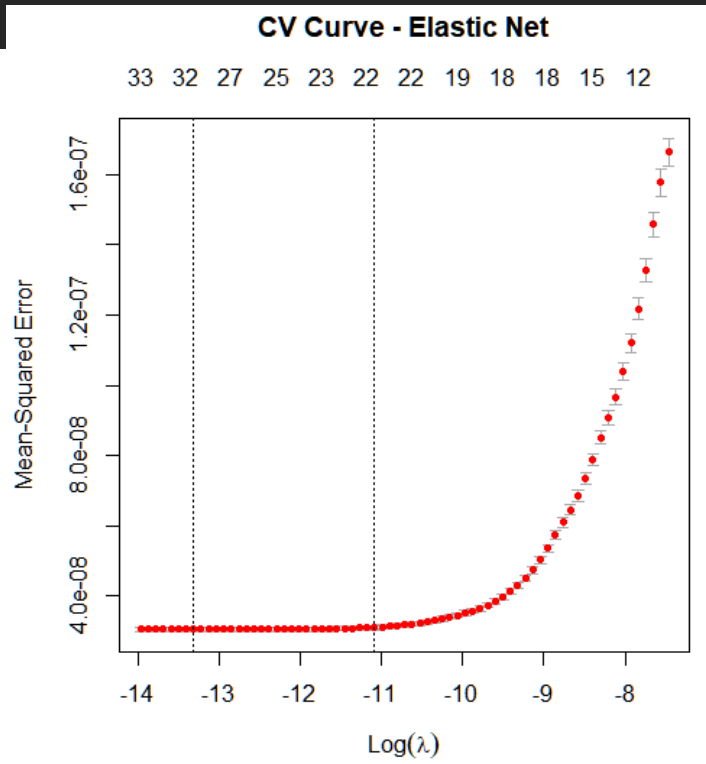
# Cross Validation Curves




Run Time: .406 seconds

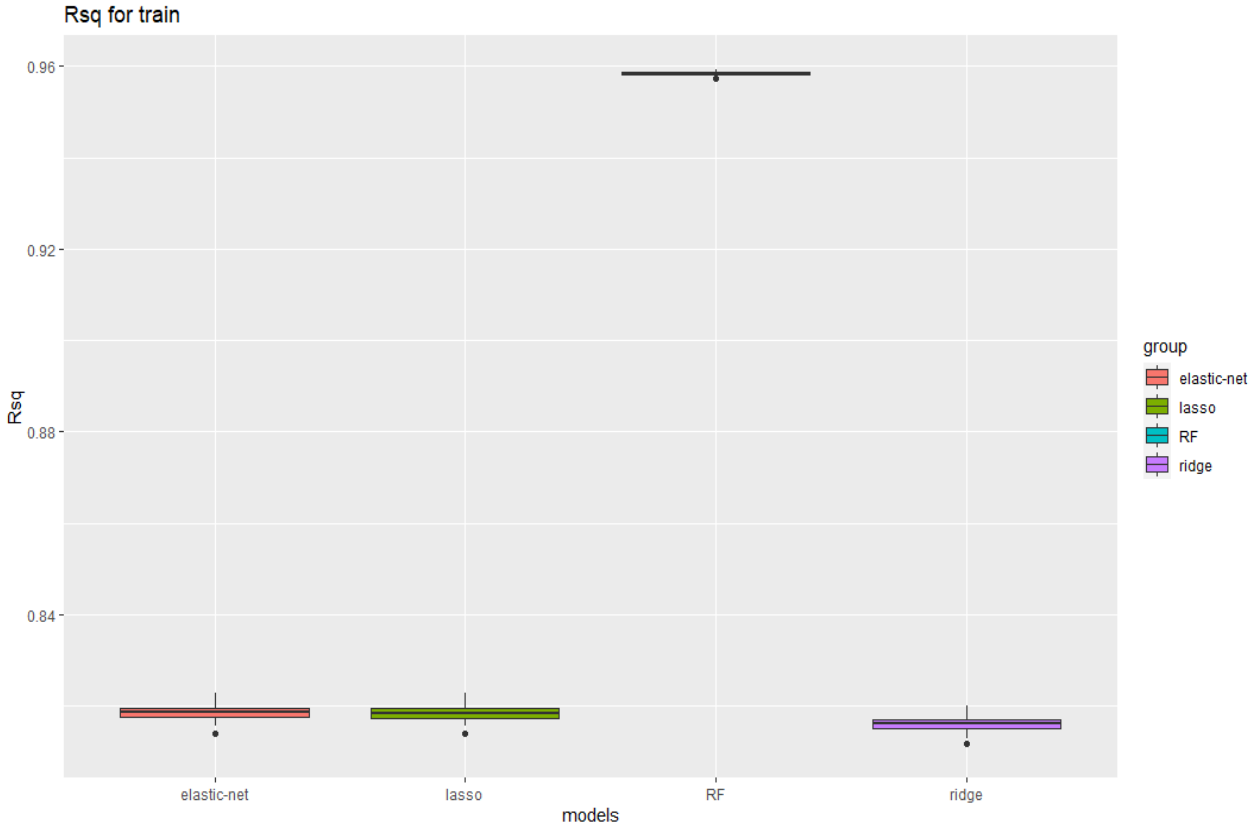


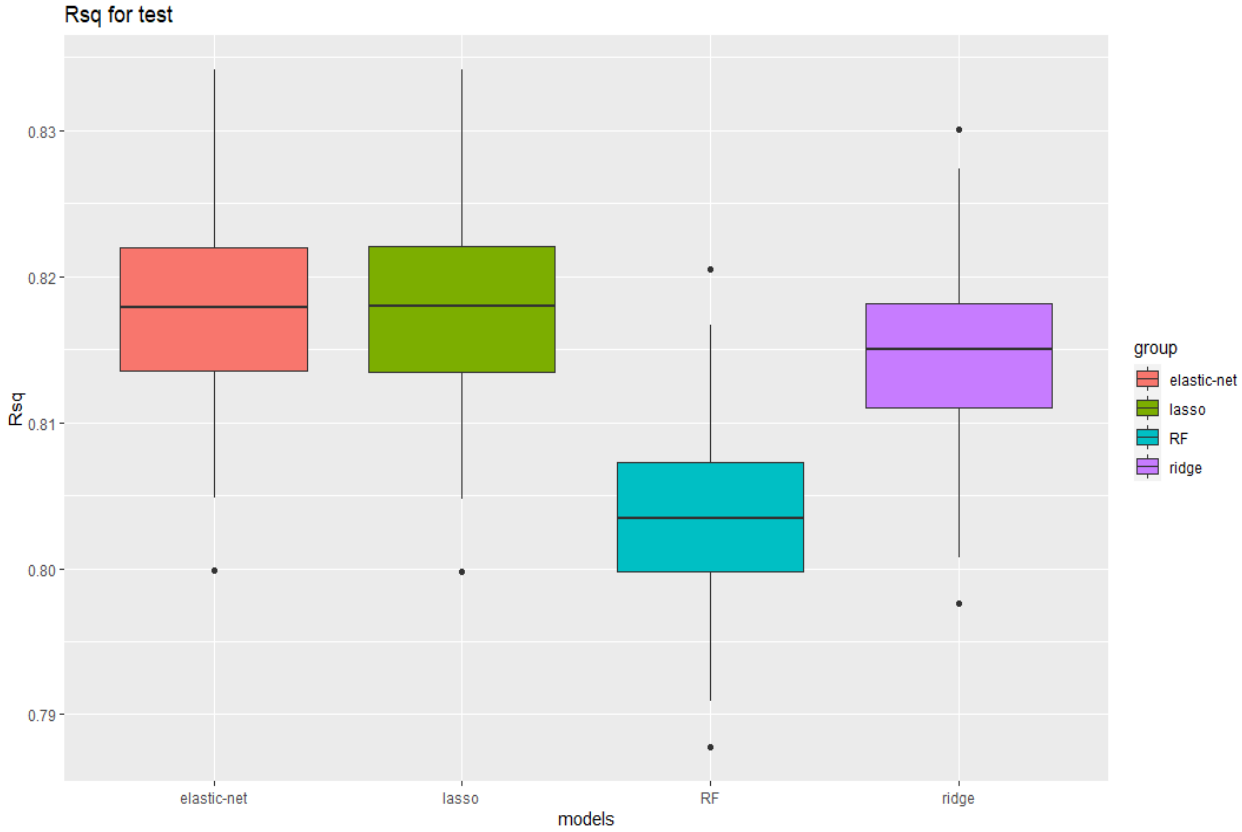

Run Time: .343 seconds



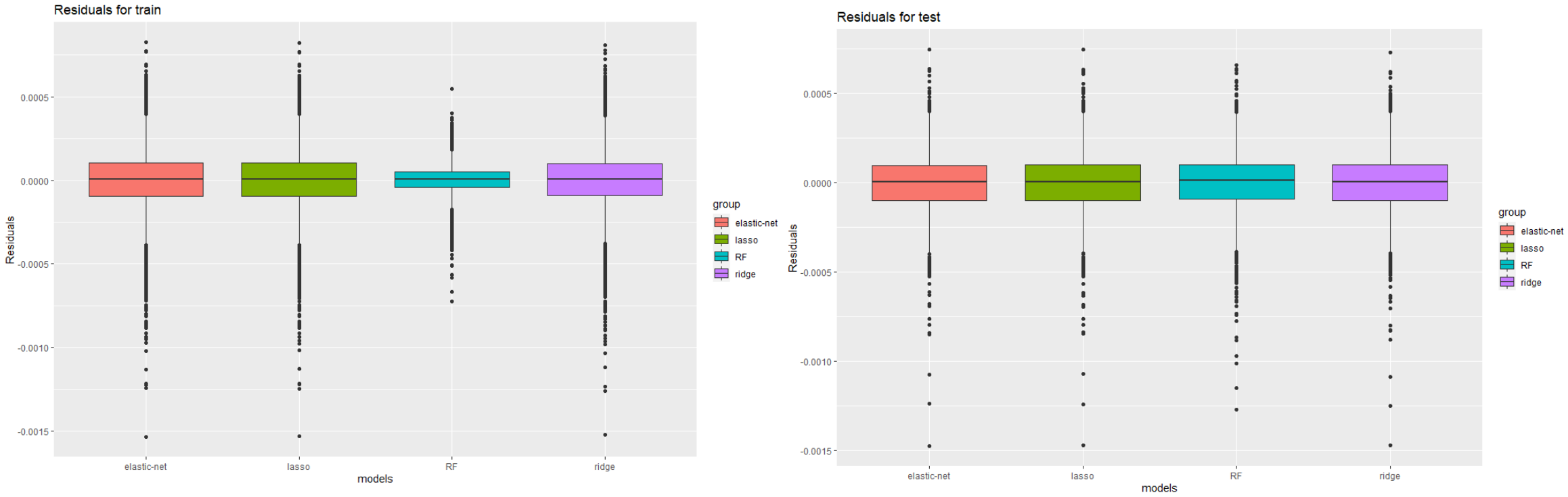

Run Time: .317 seconds

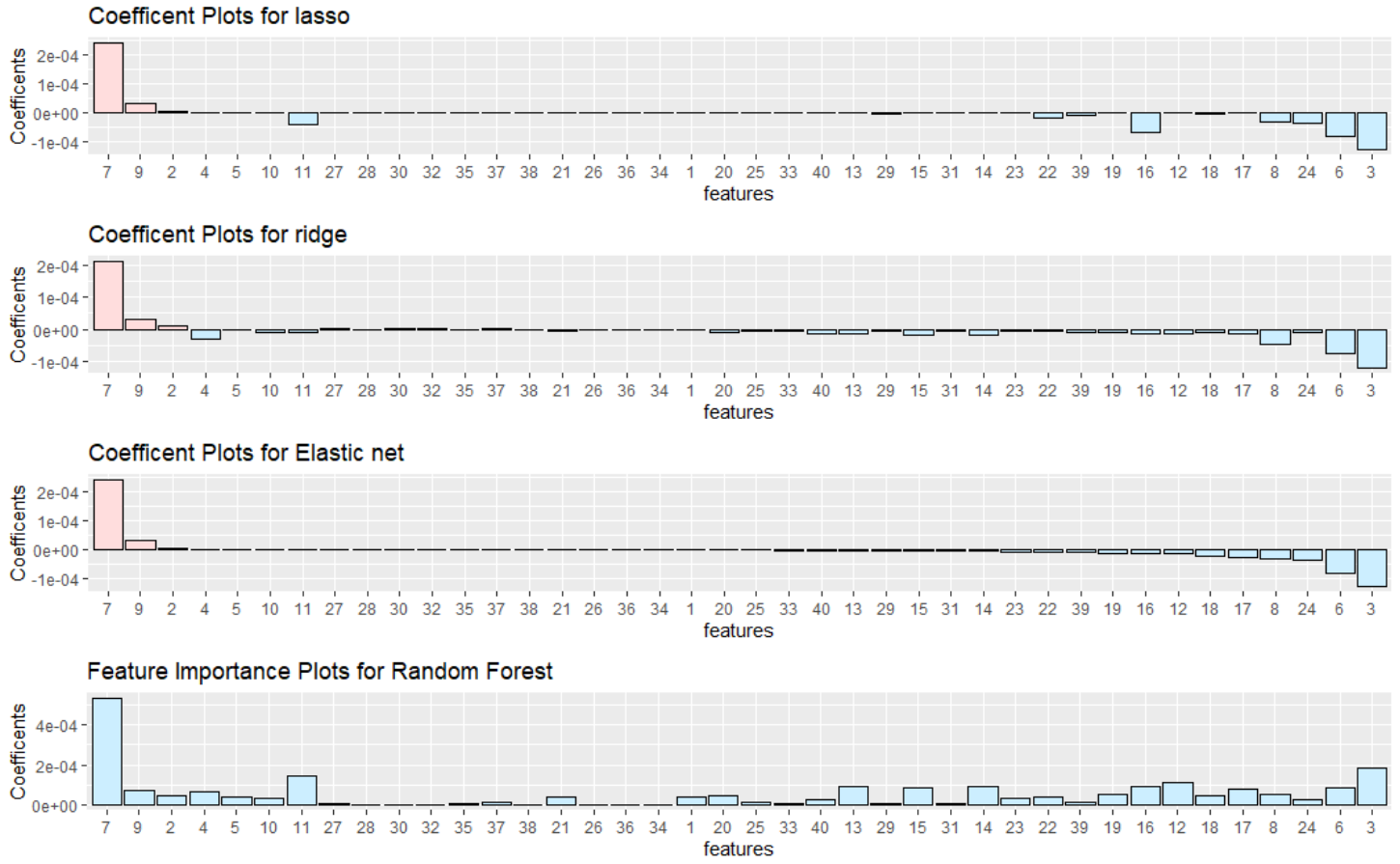
# $R^2$ Boxplots for Training and Test Data



# Residual Boxplots for Training and Test Data






## Important Variables

- 7, 3, & 6 : absRoll, p, curRoll
- No Dictionary – Interpretation Difficult

# Accuracy vs. Run Time

| METHOD | 90% $R^2$ INTERVAL | FULL FIT TIME |
|---|---|---|
| Ridge | .8066 - .8220 | 0.42 |
| Lasso | .8096 - .8254 | 0.33 |
| Elastic Net | .8096 - .8255 | 0.35 |
| Random Forest | .7950 - .8160 | 116.98 |

# Concluding Remarks

- Random Forest – Tends to overfit, very slow. Multicollinearity an issue.
- Lasso, Ridge, Elastic Net – Solid performance. Reduced Variance at the cost of added bias
- Next Steps :
  - Refine the Ridge, Lasso, or Elastic Net Model.