1. Intro

* + The problem – Why do I want to estimate the variance components (VCs) and approximate the effective degrees of freedom (EDF)? How does it help me in designing and analysing the experiments?

2. Describe how the VCs and EDF relevant to the problem.

* + Note that VC can be estimated by either linear combinations (LC) of the expected mean squares or restricted maximum likelihood methods. To decide which method to use, it depends on type of design that is presented, i.e. completely randomised design (CRD), randomised block design (RBD) or balanced incomplete block design (BIBD). Hence, one question can be answer here is that which method is the best to use under which design.
  + Tell the reader what I am going to talk about (i.e. summary)

3. Theory for estimating the variance components and compute the effective degrees of freedom

* + Briefly describe the estimation of VC using the LC method.
  + Describe the estimation of VC using the REML method
    - Construct the log-Likelihood function of the random variables base on chi-square distribution, where the random variables are the mean squares
    - Score function and Fisher’s information matrix
    - Fisher’s scoring algorithm for variance component estimation

4. Satterthwaite approximation for computing the EDF

* + Compare what I have done here with Jarrett and Ruggiero (2008).

5. Illustrate the theory with three examples for each of three designs (CRD, RBD and BIBD)

* Example of three designs
* Illustrate the detail mathematical derivation of each example.

6. Present the R funciton

* + Discuss the implementation of the getVcEDF
  + Using examples in Section 3
    - Discuss the EDF plots

7. Summary and Conclusion

Discuss EDF plot