

ZND

Computational methods of combustion

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1 INTRODUCTION

Purpose of the project is to evaluate relation between detonation cell size and induction time.

From [2]: The ZND detonation model is a one-dimensional model for the process of detonation of an explosive. It was proposed during World War II independently by Y. B. Zel'dovich,[1] John von Neumann,[2] and Werner Dring,[3] hence the name.

2 METHODS

ZND python code comes from [2]

3 RESULTS

From figure 1 we read induction time for hydrogen is 0.4 micro seconds. Then figure 1 and 2 can be compared to achieve a constant:

$$t_{ind} = a\lambda$$

$$a = \frac{t_{ind}}{\lambda} = 3.33975E - 05$$

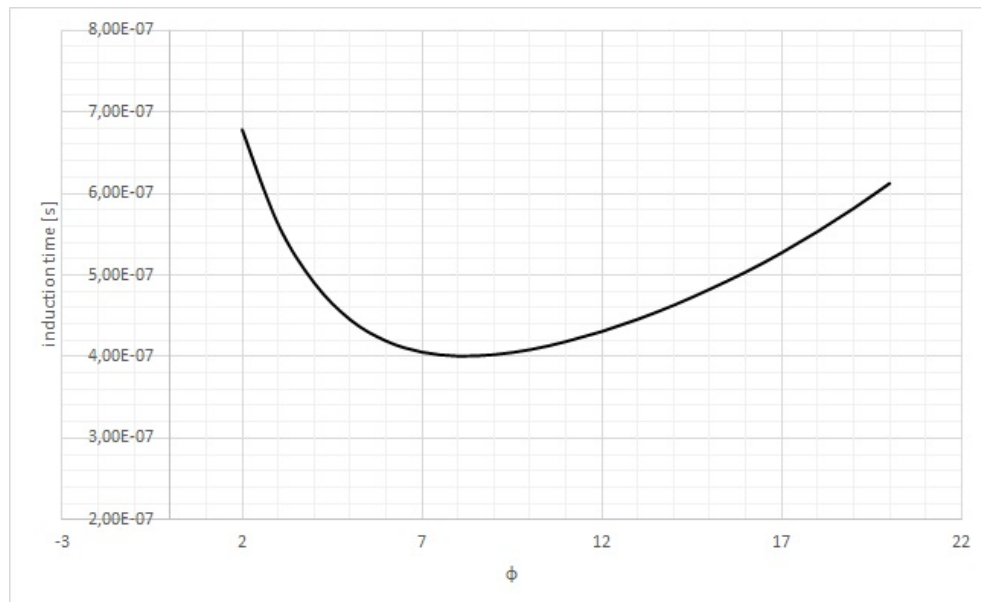


Figure 1: CJ speed for varying methane concentration

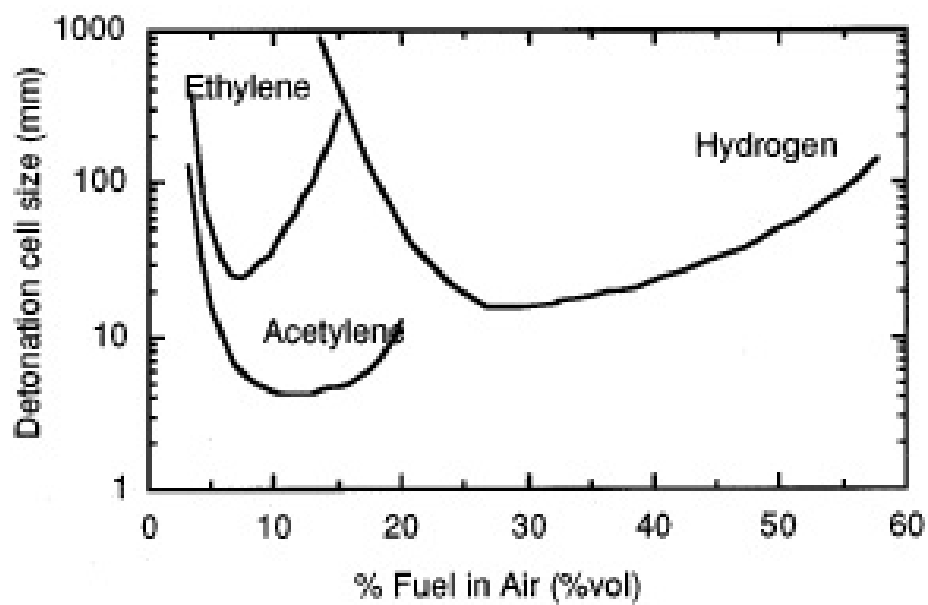


Figure 2: Post shock pressure for varying methane concentration

4 SUMMARY

This paper proved that induction time is so small that it can usually be omitted in calculations.

REFERENCES

- [1] ZND detonation model, Wikipedia https://en.wikipedia.org/wiki/ZND_detonation_model

- [2] SDToolbox http://shepherd.caltech.edu/EDL/public/cantera/html/SD_Toolbox/