

WYDZIAŁ MECHANICZNY ENERGETYKI I
LOTNICTWA

INDIVIDUAL REPORT MKWS

PROJECT 2
**Comparison of detonation speed of
different mixtures**

Submitted By :
Bogusław Sowa

June 2019

Contents

1	Introduction	2
2	Results	3
3	Conclusions	4

1 Introduction

The goal of this project was to compare detonation speed of three different mixture that are :

- Methane
- Propane
- Hydrogen

To make a project more professional detonation simulation for each mixture was calculated for three different initial conditions :

$$T_1 = 300K, p_1 = 1atm$$

$$T_2 = 400K, p_2 = 1,5bar$$

$$T_3 = 600K, p_3 = 3bar$$

Calculations were performed using Cantera. Additionally SDToolbox library was used to simulate the process. The library was downloaded from

<http://shepherd.caltech.edu/EDL/publicresources.html>

Each of mixtures were burnt in stochiometric composition.

2 Results

The results were presented in the table below :

L.p.	Initial conditions	Mixture	Detonation speed [m/s]
1.	T = 300 K p = 1 atm.	Hydrogen	2837,0
2.		Methane	2390,6
3.		Propane	2357,5
4.	T = 400 K p = 1,5 bar	Hydrogen	2829,2
5.		Methane	2389,5
6.		Propane	2359,6
7.	T = 600 K p = 3 bar	Hydrogen	2818,3
8.		Methane	2393,3
9.		Propane	2370,3

3 Conclusions

- Detonation speed is various for different mixtures
- Detonation speed is various for different initial conditions
- Detonation speed for Methane and Propane is increasing with higher value of pressure and temperature what is different for Hydrogen
- Initial conditions differences in the project cause small detonation speed differences

Bibliography

1. <http://shepherd.caltech.edu/EDL/publicresources.html>
2. "Wprowadzenie do Shock Detonation Toolbox" Presentation by Agnieszka Jach