README file belonging to the Delft-Jet-in-Hot-Coflow (DJHC) Database
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Contact person:
Prof. Dirk Roekaerts
Delft University of Technology
d.j.e.m.roekaerts@tudelft.nl

Contents of the database.

The database concerns flames of a jet of Dutch natural gas entering in a coflow consisting of the flue gas from a secondary burner. For the detailed description of the burner and the coordinate system used to represent the data, reference is made to the publications by Oldenhof et al listed below.

In the experiments the oxygen concentration and the temperature of the coflow have been varied. Three cases have been studied in more detail. They are denoted as DJHC-I, DJHC-V and DJHC-X. The first case has been studied for three different Reynolds numbers of the fuel jet. The other two cases only for one Reynolds number of the fuel jet. This has resulted in a database with five directories corresponding to the five experimental settings.
DJHC-I-Re3K, DJHC-I-re4K5, DJHC-I-Re8K5
DJHC-V-Re4K5
DJHC-X-Re4K5
The numbers following "Re" hint to estimates of the jet Reynoldsnumbers (3000, 4500, 8500). Accurate values are given in Oldenhof (2011).

For each case detailed data (radial and axial profiles of mean and variance) are available for velocity and temperature.. In addition the radial profile of the mean composition of the coflow is available as "flue gas data". Also OH-PLIF data are available

Notes on the file structure
The files are ordered per case, and subdivided into **temperature**, **velocity**, **flue-gas** and **OH-PLIF** data.
Velocity data is in .csv format. The columns contain: r [mm], U , V ,u'u' ,v'v' ,u'v' (all [m/s] and [m^2/s^2]).
Temperature data is also in .csv format. The columns contain: r [mm], T [K] and rms(T) [K] along with fitting data(columns 4 and 5).
Flue gas data data is also in .csv format. The columns contain: r [mm], O2 vol % and measured CO and NO, at z=3 mm for the different cases..
OH-PLIF data is stored in CDF format. These contain an array with X-coordinates, Y-coordinates, mean OH-LIF signal and the rms of the OH-LIF signal. As the OH-PLIF data is not quantitative, the value has arbitrary units. Values were rescaled to values between 0 and 255 (unsigned integer, 8 bits).
Note: OH-PLIF data are not distributed with the standard release but are available on request.

Acknowledgement:

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Documentation:

Main publications on the experiments that have led to the creation of the database:

Ernst Oldenhof, 'Auto-ignition and flame stabilisation processes in non-premixed turbulent hot coflow flames', PhD Thesis, Delft University of Technology, March 20, 2012
Available from http://repository.tudelft.nl/

E. Oldenhof, M.J. Tummers, E.H. van Veen, and D.J.E.M. Roekaerts,
Ignition kernel formation and lift-off behaviour of jet-in-hot-coflow flames,
Combustion and Flame, 157 (6) 1167-1178, 2010

E. Oldenhof, M.J. Tummers, E.H. Van Veen, and D.J.E.M. Roekaerts,
Role of entrainment in the stabilisation of jet-in-hot-coflow flames,
Combustion and Flame, 158 (8) 1553-1563, 2011

Related publications using the same burner:

E. Oldenhof, M.J. Tummers, E.H. van Veen, and D.J.E.M. Roekaerts,
Transient response of the Delft jet-in-hot-coflow flames.
Combustion and Flame, 159 (2) 697-706, 2012

Ernst Oldenhof, Mark J. Tummers, Eric H. van Veen, Dirk J. E. M. Roekaerts,
Conditional flow field statistics of jet-in-hot-coflow flames,
Combustion and Flame, 160 (8) (2013) 1428-1440
doi:10.1016/j.combustflame.2013.03.003

TU Delft Publication on the modeling of the experiments in the database:

A. De, E. Oldenhof, P. Sathiah, and D. Roekaerts,
Numerical Simulation of Delft-Jet-in-Hot-Coflow (DJHC) Flames using the Eddy Dissipation Concept model for turbulence-chemistry interaction,
Flow, Turbulence and Combustion, 87(4) 537-567, 2011

M.A. Etaati, D. Roekaerts, G. Sarras and M. Stoellinger, Modeling of the Delft jet-in-hot-coflow burner as a non-adiabatic three stream problem, European Combustion Meeting, Cardiff, June 29- July 1, 2011, T. Griffiths (Ed.), Cardiff, UK,, paper 293, 1-6

G. Sarras, M.K. Stoellinger and D.J.E.M. Roekaerts, Transported PDF simulations of the Delft-jet-in-hot-coflow, burner based on 3D FGM tabulated chemistry, In: Book of Extended Abstracts, Turbulence, Heat and Mass Transfer 7, K.Hanjalic, Y.Nagano, D.Borello, S.Jakirlic (Eds.), Begell House, Inc., 2012, pp 729 – 732

G. Sarras, M.K. Stoellinger and D.J.E.M. Roekaerts, Transported PDF simulations of the Delft-jet-in-hot-coflow, burner based on 3D FGM tabulated chemistry, In: Proceedings Turbulence, Heat and Mass Transfer 7, K.Hanjalic, Y.Nagano, D.Borello, S.Jakirlic (Eds.), Begell House, Inc., 2012, 10 pages

G.Sarras, M.K.Stoellinger, D.J.E.M. Roekaerts, Transported PDF simulations of the Delft Jet-in-Hot-Coflow burner based on 4D-FGM tabulated chemistry, In: Proceedings of the European Combustion Meeting – 2013, Paper P1-80, 6 pp, June 25-28, 2013, Lund, Sweden, ISBN 978-91-637-2151-9.

G. Sarras, Y. Mahmoudi, L.D. Arteaga Mendez, E.H. van Veen, M.J. Tummers, and D.J.E.M. Roekaerts, Modeling of Turbulent Natural Gas and Biogas Flames of the Delft Jet-in-Hot-Coflow Burner: Effects of Coflow Temperature, Fuel Temperature and Fuel Composition on the Flame Lift-Off Height, Flow, Turbulence and Combustion, 2014, 93: 607-635
http://dx.doi.org/10.1007/s10494-014-9555-3

Bao H. Development and validation of a new Eddy Dissipation Concept (EDC) model for MILD combustion, MSc Thesis, Delft University of Technology, 2017.

Perpignan A.A.V., Gangoli Rao A., Roekaerts, D.J.E.M., Flameless Combustion and its Potential Towards Gas Turbines, Progress in Energy and Combustion Science (2018)

Huang X. PhD Thesis, Delft University of Technology, 2018, to be published