Large scale combustion of premixed hydrogen–air mixtures modeling using CABARET approach

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A flame velocity based model of large-scale combustion of hydrogen-steam-air mixtures was implemented in the CABARET-SC1 [1] program. The model was verified on problems of turbulent combustion of homogeneous hydrogen-air mixtures in obstructed channel on ENACCEF facility [2]. Initially facility is filled with homogeneous hydrogen–air mixture at 1 bar and 296 K with hydrogen volume fraction of 13%. The flame acceleration tube is obstructed with 9 circular obstacles creating blockage ratio of 0.63. Three calculation meshes with typical cell sizes of 8, 4 and 2 mm were used in calculations. A good agreement between experimental data and calculations results on flame position and flame front velocity is shown. The research is carried out using the equipment of the shared research facilities of HPC (high performance computing) resources at the Lomonosov Moscow State University [3].

[1] Bol'shov L A *et al* 2020 *At. Energy* **127** 216–222
[2] Bentaib A *et al* 2014 *Ann. Nucl. Energy* **74** 143–152
[3] Voevodin V l 1986 *Supercomput Front Innov* **6** 4–11