2A03: EXPERIMENTAL INVESTIGATION OF VERY RICH LAMINAR SPHERICAL FLAMES UNDER MICROGRAVITY CONDITIONS.

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For very rich laminar spherical flames with CO_2 dilution, the laminar flame speed is around a few center meter per second and the thermal radiation strongly affects the flame propagating speed: on one hand, the incoming flow toward the center induced by the radiative cooling of the high temperature products inside a spherical flame slows the flame propagation [1]; on the other hand, the radiative absorption (mainly due to CO_2 in the unburned mixture) preheats the unburned gas and thus increases the flame propagating speed [2].

References:

[1] Z. Chen, M.P. Burke, Y. Ju, in: *Effects of radiation on the determination of laminar flame speed using propagating spherical flames*. SIAM: 12th International Conference on Numerical Combustion, Monterey, California, USA, Mar. 2008.
[2] Z. Chen, X. Qin, B. Xu, Y. Ju, F. Liu, *Proc. Combust. Inst*. 31 (2007) 2693–2700.

Reply by S. Jerzembeck

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Thank you for pointing at your papers. An evaluation of the Boltzmann number appearing in eq. (14) of your 31st Symposium paper shows that it should be even smaller than the values shown in your Fig. 8. This is because the mass burning rate of our flames is larger than of yours because of the higher densities. Therefore the overall radiative cooling effect should be negligible.