2C07: CMC SIMULATIONS OF LIFTED TURBULENT JET FLAME SUPPORTED BY A VITIATED COFLOW.

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Comment by Godfrey Mungal, Stanford University, USA
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I wonder if your approach would work for data where the co-flow velocity is at ambient temperature as in [1, 2, 3], rather than elevated temperature.

References:

[1] L. Muñiz, M.G. Mungal, *Comb. Flame* 111 (1997) 16–31.
[2] Donghee Han, M.G. Mungal, *Proc. Combust. Inst*. 28 (2000) 537–543.
[3]. L.K. Su, O.S. Sun, M.G. Mungal, *Comb. Flame*, 144 (2006) 494–512.

Reply by K. N. Lakshmisha
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In principle, our approach should work for the lifted flames you have studied. However, when coflow temperature is ambient, the liftoff height tends to be higher (l/d ~ 8.6–19.2 in [3] and ~ 19–29 in [1] in the comment). Further, the mean axial velocities are much lower in these flames. This allows ample time for the jet and coflow streams to undergo significant premixing. In our approach, premixing is not addressed adequately, which we think could contribute to errors in predictions. Accuracy of modeling the mean scalar dissipation rate is another issue that might arise (you have reported considerable movement of the flame base location [1] in the comment). These are interesting challenges one could undertake.

Comment by Robert Gordon, Technical University of Darmstadt, Germany
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The conclusion that the flames are stabilized through premixed flame propagation at high coflow temperatures is surprising. Can the authors demonstrate that their code and models are able to successfully predict a simple premixed flame test case, and that for this case, the budgets faithfully identify the flame as premixed (and distinguish it from autoignition)? This is a necessary prerequisite for this conclusion.

Reply by K. N. Lakshmisha
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Our calculations show that the high coflow temperature case is stabilized by autoignition and low coflow temperature case is stabilized by premixed flame (Figs 7,8 in the paper). The CMC in its present form (mixture fraction formulation) is not suitable for purely premixed combustion. We are in the process of investigating similar change in

stabilization process due to coflow velocity. Further, certain DNS data would help us to validate Figs.7,8.