Abstract Submitted
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Premixed flame response to pressure fluctuations using an implicit solver with detailed chemistry[1] NADEEM MALIK, King Fahd University of Petroleum and Minerals — A major challenge in combustion research is the coupling of the compressible flow field to the detailed thermochemistry. Recent advances in numerical solvers has met this challenge within an implicit numerical framework, retaining the full stiffness of the realistic comprehensive chemistry and multicomponent transport properties in the system. Here, the solver TARDIS (Transient Advection Reaction Diffusion Implicit Simulations) [1–4] is demonstrated, first, by investigating the laminar flame speed in stoichiometric H2/air and CH4/air flames as a function of the flame curvature and found to follow non-linear regimes, contrary to previous thinking. Second, planar and curved laminar flames are subjected to pressure and equivalence ratio oscillations and found to respond through a spectrum of time and length scales. TARDIS has the potential to elucidate fundamental aspects of flame structure and thermochemistry, and could be the basis for a new generation of implicit DNS solvers. REFERENCES: [1] N. A. Malik, *Combust. Sci. Tech. 182:10-11, 1787-1798 (2012).* [2] N. A. Malik, & R. P. Lindstedt, *Combust. Sci. Tech. 182:9, 1171-1192 (2010).* [3] N. A. Malik, & R. P. Lindstedt, *Combust. Sci. Tech. 184:10-11, 1799-1817 (2012).* [4] N. A. Malik, T. Korokianidis, & T. Lovas. *Submitted, PLOSH ONE, (2015).*

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Nadeem Malik
King Fahd University of Petroleum and Minerals

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