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# Propositions

accompanying the dissertation

## HIGHLY STRAINED LEAN PREMIXED HYDROGEN FLAMES EMISSIONS, STABILITY AND MODELLING

by

**Alessandro PORCARELLI**

1. Manifolds of fixed-strain flamelets improve accuracy and retain affordability of tabulated chemistry models for simulating lean premixed hydrogen flames in highly strained configurations. *This proposition pertains to this dissertation*
2. Previous works using unstretched flamelet manifolds with presumed FDF closure erroneously predict the macroscopic burning features of thermodynamically unstable and turbulent hydrogen flames due to compensation of effects. *This proposition pertains to this dissertation*
3. The integral NO emissions are inversely proportional to strain rate in lean premixed hydrogen-air flames. *This proposition pertains to this dissertation*
4. Sufficiently high strain regimes ( $a > 3000 \text{ s}^{-1}$ ) enable the suppression of intrinsic flame instabilities in lean premixed hydrogen-air flames. *This proposition pertains to this dissertation*
5. Distinguishing the contribution of differential and preferential diffusion effects to the onset of thermodynamically unstable instabilities often feels like splitting hairs.
6. The arrogance of scientists in assuming the public inherently understands scientific uncertainty has failed to guide people through complex findings and has eroded trust in their achievements.
7. No zero-emission technology can offset the pollution driven by the unchecked consumption of the wealthiest.
8. Property becomes theft when wealth is hoarded through inheritance and insufficient redistribution prevents equal opportunities for the collectivity.
9. Monopolies have transformed innovation from a public good into a private asset, and 'progress' has raised prices faster than wages.
10. The Social Doctrine of the Catholic Church, based on competing small enterprises and mutual aid, establishes a model for prosperity and dignity that resists both neoliberal monopolism and communist collectivism.

These propositions are regarded as opposable and defensible, and have been approved as such by promoters prof. dr. A. Gangoli Rao and dr. I. Langella.