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Experimental observations of the development and growth of flame instabilities formed during vented deflagrations C. REGIS BAUWENS, FM Global, Research Division, JEFFREY M. BERGTHORSON, McGill University, SERGEY B. DOROFEEV, FM Global, Research Division — The formation of instabilities on the surface of large expanding flames can significantly increase the rate of flame propagation and heat release. As the rate of heat release is the key parameter that determines the pressures that develop, the formation of these instabilities have a strong role in determining the consequences of accidental explosions. For this work, large-scale experiments of uniform propane-air mixtures in a 64 m^3 vented enclosure were performed. The formation of hydrodynamic flame instabilities, including the Darrieus-Landau and Rayleigh-Taylor instabilities, as well as strong flame-acoustic interactions, was observed. These instabilities were found to be the primary driver of the pressures that developed and were ultimately responsible for the overall maximum overpressure.

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