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Modifying intake flow to increase EGR tolerance in an Internal Combustion Engine[1] DANIEL RUBIO, University of Central Florida, MEBOUGNA DRABO, PAUL PUZINAUSKAS, University of Alabama — The worldwide effort to reduce vehicle emissions and increase fuel efficiencies has continuously intensified as the need to improve air quality and reduce fuel consumption becomes more acute. Exhaust gas recirculation (EGR) is a method that has long been employed to reduce combustion temperatures and therefore reduce thermal NOx formation and accommodate higher compression ratios and more optimum combustion phasing for improved efficiency. Generally the effective EGR level as a percent of trapped charge is limited by its affect on combustion stability. Inducing flow structures such as swirl, squish and tumble in the trapped charge have proven to extend this EGR limit in homogeneous charge spark-ignited engines at part load, but this enhancement has not been significantly studied at full loads in such engines. This research explored modifying the intake flow into an engine to create tumble and evaluate its effect at high loads in such engines. This exploration included characterizing the flow on a steady flow bench and quantifying the results using engine dynamometer tests.

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