

Abstract Submitted  
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**Analysis of Tumble and Its Effects on EGR Tolerance for a Gasoline Engine Running at High Loads**<sup>1</sup> JORDAN EASTER, PAULIUS PUZIN-AUSKAS, TIMOTHY PYLES, University of Alabama — The series hybrid electric vehicle allows for the design of an engine that can run solely at its most efficient point, wide open throttle (WOT). However, at WOT there is an increase in emissions not typically handled in the conventional gasoline engine. Exhaust gas recirculation can be used to reduce emissions if the tolerance of the engine for the exhaust gas is increased. It is hypothesized that tolerance at WOT will increase when there is an increase in in-cylinder turbulence. In this research, aluminum flow guide vanes were inserted in the intake to induce tumble. The flow was examined through the use of PIV techniques and the increase in EGR tolerance was verified with engine testing. PIV images of the flow structure were taken between the intake valves of a modified cylinder designed to mimic bottom dead center. The lift to valve diameters as well as the vane configurations were altered. Engine testing was performed with varying vane configurations, while the EGR percentage was increased until it became difficult to control combustion. It was found through the engine testing that the flow guide vanes do significantly increase the EGR tolerance as well as combustion stability.

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