

Abstract Submitted
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A Method for Turbocharging Four-Stroke Single Cylinder Engines¹ MICHAEL BUCHMAN, AMOS WINTER, Massachusetts Institute of Technology — Turbocharging is not conventionally used with single cylinder engines due to the timing mismatch between when the turbo is powered and when it can deliver air to the cylinder. The proposed solution involves a fixed, pressurized volume – which we call an air capacitor – on the intake side of the engine between the turbocharger and intake valves. The capacitor acts as a buffer and would be implemented as a new style of intake manifold with a larger volume than traditional systems. This talk will present the flow analysis used to determine the optimal size for the capacitor, which was found to be four to five times the engine capacity, as well as its anticipated contributions to engine performance. For a capacitor sized for a one-liter engine, the time to reach operating pressure was found to be approximately two seconds, which would be acceptable for slowly accelerating applications and steady state applications. The air density increase that could be achieved, compared to ambient air, was found to vary between fifty percent for adiabatic compression and no heat transfer from the capacitor, to eighty percent for perfect heat transfer. These increases in density are proportional to, to first order, the anticipated power increases that could be realized.

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