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T. Zhang* (zhang_t@math.psu.edu) and **Y. Zheng** (yzheng1@yu.edu). *Structure of solutions near sonic line for pressure gradient equation.*

We consider the two-dimensional pressure gradient system in the self-similar plane and show that a local smooth solution exists extending from a sonic line towards the hyperbolic region with given boundary conditions on the sonic line. Characteristics are only Hölder continuous at the sonic line. We introduce a new coordinate system, that involves the state variable pressure p as well as the self-similar ones, so that the characteristics become smooth and terms of singularity are shifted to within the lower order terms in the characteristic form of the equation. We establish the existence of a local smooth solution by showing that an iteration sequence converges under a new metric. (Received September 22, 2011)