1106-53-1678 **Arthur E. Fischer*** (aef@ucsc.edu), Department of Mathematics, University of California, Santa Cruz, CA 95064. *Conformal Ricci Flow, Navier-Stokes Equations, and Conformal Reduction of Einstein's Evolution Equations of General Relativity.*

We introduce a variation of the classical normalized Ricci flow equations that modifies the *volume constraint* of those equations to a *scalar curvature constraint.* The resulting equations are named the *conformal Ricci flow equations* because of the role that conformal geometry plays in constraining the scalar curvature. These new equations are given by

$$\begin{aligned} \frac{\partial g}{\partial t} + 2\big(\mathrm{Ric}(g) + \tfrac{1}{n} g\big) &= -pg \\ R(g) &= -1 \end{aligned}$$

for a dynamically evolving metric g and a non-dynamical scalar field p, known as the *conformal pressure.* The conformal Ricci flow equations are analogous to the Navier-Stokes equations of fluid mechanics

$$\begin{aligned} \frac{\partial v}{\partial t} + \nabla_v v + \nu \Delta v &= -\mathrm{grad}\ p \\ \mathrm{div}\ v &= 0 \end{aligned}$$

Just as the real physical pressure in fluid mechanics serves to maintain the incompressibility constraint of the fluid, the conformal pressure serves as a Lagrange multiplier to conformally deform the metric flow so as to maintain the scalar curvature constraint. The conformal Ricci flow equations can be thought of as Navier-Stokes equations for the metric and also as a parabolic model for the *conformally reduced Einstein evolution equations.* (Received September 14, 2014)