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Bubble coalescence in a power-law fluid PRITISH KAMAT, SUMEET THETE, OSMAN BASARAN, Purdue University — As two spherical gas bubbles in a liquid are slowly brought together, the liquid film or sheet between them drains and ultimately ruptures, forming a circular hole that connects them. The high curvature near the edge of the liquid sheet drives flow radially outward, causing the film to retract and the radius of the hole to increase with time. Recent experimental and theoretical work in this area has uncovered self-similarity and universal scaling regimes when two bubbles coalesce in a Newtonian fluid. Motivated by applications such as polymer and composites processing, food and drug manufacture, and aeration/deaeration systems where the liquids often exhibit deformation-rate thinning rheology, we extend the recent Newtonian studies to bubble coalescence in power-law fluids. In our work, we use a combination of thin-film theory and full 3D, axisymmetric computations to probe the dynamics in the aftermath of the singularity.

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