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Drainage dynamics of aqueous foams generated by sparging and turbulent mixing MATTHEW J. KENNEDY[1], MICHAEL W. CONROY, RAMAGOPAL ANANTH, JAMES W. FLEMING, Naval Research Laboratory — We investigate the effect of bubble size on the drainage dynamics of aqueous fire-suppression foams using laboratory-scale foam generators and theoretical modeling. We generate foams over a wide range of bubble sizes using two foam generation methods–sparging using fritted sheets of steel, and turbulent mixing using high-pressure T-junctions. The sparged foams comprise bubbles of mean diameter 0.5 mm or larger and begin draining immediately whereas the turbulently mixed foams comprise bubbles of mean diameter 0.15 mm or smaller and begin draining after induction times of 5-15 minutes. We study two proprietary fire-suppression foam solutions: a non-fluorinated surfactant solution containing viscous additives intended for use as a wet foam, *i.e.* liquid fraction > 0.1, and a sodium dodecyl sulfate surfactant solution intended for use as a dry foam, *i.e.* liquid fraction < 0.005. The change in liquid retention time due to change in mean bubble size differs between these two solutions. We compare our experimental results with theoretical models to examine the reasons for the difference in liquid retention time.

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