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How surfactants influence the drop size in sprays DANIEL BONN, Institute of Physics, University of Amsterdam — Spraying is a widely used method to produce a liquid sheet that break up into droplets of a certain size distribution. When spraying simple liquids, it is known which experimental parameters determine the droplet size distribution. For many applications however, surfactants are added, producing a hitherto unknown effect on the droplet size distribution. Using two generic types of spraying nozzles, we sprayed solutions of different types of aqueous surfactants and measured the droplet size distribution of the sprays. We find that the breakup of surfactant solutions is similar to that of pure water but results in droplets that are on average smaller. The resulting droplet size distribution can be well described using the predictions for simple liquids provided that we replace the parameter of the equilibrium surface tension with the dynamic surface tension of the surfactant solution at a surface age of 20 ms, which is the characteristic time for destabilization and breakup of a liquid sheet. By rescaling them with the mean droplet size, the droplet size distributions of water and sprays with different concentrations of surfactants all collapse onto a single curve and can be well described using the compound Gamma function found previously for pure liquids.

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