Nori, Plourde, and Bretz Reply: Reference [1] deals with (i) deposition, (ii) growth, (iii) coalescence, (iv) motion, and, especially, (v) avalanching of fluid droplets dripping off the edge of a sprayed surface, while the preceding Comment [2] only deals with a simple model of deposition, where droplets \textit{neither coalesce, move, avalanche nor leave} the deposition surface. Thus [1] and [2] consider very different processes; so the simple static analysis presented in [2] does not apply to the highly interactive complex \textit{dynamics} of avalanching and dripping [1]. For instance, moving droplets engulf stationary droplets in their path leaving wedge-shaped “cleared” regions (central to [1] and ignored in [2]), drastically changing the droplet size distribution on the sprayed surface. For a careful and systematic study of (i)–(iv), and especially (v), the reader is referred to Refs. [1,3] and the many references therein.

Unfortunately, the notation used in [2] is misleading because what [2] calls the droplet size \( S \) \textit{is not} the measured \( S \) used in [1] (which involved droplets moving, coalescing, and avalanching). This invalidates the comparison between their Fig. 1 (for nonmoving, noncoalescing, and nondripping droplets) and our Fig. 2, and also the comparison of their special number \( -\frac{2}{3} \), which is close to one of the several exponents obtained in [1]. No special emphasis on this number exists in [1] because our exponents are only linear fits to data. Furthermore, some of the results shown and discussed in [1] have no power law dependence at all. Finally, numerical agreement between different constants can lead to misleading conclusions (see, e.g., [4]).

We analyzed the statistics of water droplet avalanches in a continuously driven system [1]. Distributions were obtained for avalanche (a) size, (b) lifetime, and (c) time between successive avalanches, along with (d) power spectra and (e) return maps. We observed a variety of behaviors for the size and lifetime distribution of water droplet avalanches, \textit{ranging from power law, for low flow rates and different water viscosities, to exponential behavior with characteristic scales, for high flow rates}. Like (ii)–(v) above, the preceding Comment [2] also ignores items (b)–(e), and does not obtain the wide variety of behavior obtained in [1] using the very same geometry. Moreover, our results strongly depend on the flow rate and water viscosity, while the simple geometrical argument (focused only on \textit{nonmobile} droplets) in [2] does not have an explicit tunable flow or viscosity dependence.

The obvious effect of geometry on the distribution of avalanche sizes \( D(S) \) can be simply and convincingly seen by first considering the limiting case of a faucet dripping off a single narrow line of drops. Here \( D(S) \) is a delta function \( \delta(S - 1) \), since all avalanches have equal size. Because of the purely geometrical constraint of a very narrow dripping or “take-off” region, large avalanches are impossible. This argument can be extended to a sprayed window pane. Spraying over a small region of an inclined flat surface would also produce a narrow distribution of avalanche sizes, since the dripping region would be small. Spraying over a large region on an inclined flat surface (e.g., by using either \textit{many} spray misters or long horizontal dripping handrails [5]) would produce a large dripping region that would allow, in principle, the possibility of large avalanches. This configuration, not studied in [1,2], simulates a drizzle on a roof or window pane.

For simplicity, we used a single spray mister whose axially symmetric geometry provided good spray uniformity. Also, a dome maximized the dripping, or take-off region, thus allowing the possibility of having large avalanches. For a \textit{fixed geometry}, [1] systematically studied how fluid droplets that \textit{move, coalesce, and drip} could have avalanche distributions \textit{ranging from very narrow to very broad} as a function of several physical parameters.

Franco Nori,\textsuperscript{1} Britton Plourde,\textsuperscript{2} and Michael Bretz\textsuperscript{1}

\textsuperscript{1}Department of Physics
University of Michigan
Ann Arbor, Michigan 48109-1120

\textsuperscript{2}Department of Physics
University of Illinois
Urbana, Illinois 61801

Received 19 September 1994
PACS numbers: 64.60.Ht, 05.40.+j, 05.70.Ln