Closure to "Discussion of 'A Greenwood–Williamson Model of Small-Scale Friction' " (2008, ASME J. Appl. Mech., 75, p. 045501)

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I appreciate the comments made about the paper and the additional references. It is true that Eq. (4), taken from Johnson's book, is Mindlin's solution from his 1949 paper, and due credit should have been given. Moreover, as Johnson pointed out, a full stick solution for a Hertzian contact problem will have singularities. However, as stated in the paper: "This work is an attempt to obtain the representative qualitative features and scaling of the PSTD phenomenon without modeling the details of the single asperity solution, i.e., the traction fields on the asperity-asperity interface." The assumption that, on average, the behavior follows the Mindlin-based solution is admittedly crude, but tractable analytically. This simple relationship minimized the complexity of the resulting expressions as compared to ones based on empirical relationships, e.g., Tabor's work, and allowed for a clearer analysis of the basic mechanisms and population dynamics. More specifically, the need for substantial assumptions about the details of the asperity-asperity constitutive interaction are in counterpoint with the assumptions of smooth asperity surface geometry with well-defined radii of curvature. I assume that most researchers would agree that there are no precisely hemispherical asperities identifiable outside of the realm of theory and some artificial geometries created in the laboratory. So, given the lack of characterization of the details of asperity behavior, I think it is best to view asperities as merely actors in an ensemble, with the ensemble determining the observable behavior. Extension of the work to more detailed interactions, including those cited in the Discussion, is straightforward and is left for future work.

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