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Universal correlation between jamming distance and shear-thickening strength in dense colloidal suspensions[1] SHRAVAN PRADEEP, ALAN R JACOB, LILIAN HSIAO, North Carolina State University — Tuning shear-thickening in dense suspensions is of great interest owing to its applications in soft robotics, impact armor and industrial manufacturing. Shear-thickening strength (β), measured from slope of viscosity-stress flow curve, estimates how fast the suspension viscosity increases with applied shear rate. In this work, we show that prior knowledge of suspension jamming point (φ_J) will solely predict the β parameter in spherically-symmetric colloidal suspensions. In this study, we use smooth and rough poly(methyl methacrylate) colloids with diameters ranging from 0.98 – 1.82 microns. We found that the sheared rough suspensions shear-thicken earlier and has a lower φ_J compared to their smooth counterparts. We incorporate experimentally obtained scalings of the contact number deficit with respect to the distance from jamming ($\Delta\varphi$) into the mean–field description proposed by Wyarts & Cates (*PRL, 2014*) to predict the flow curves and compare them with experimental results. Our results suggests that there is a universal behavior in the change of β parameter from strong (>0.9) to weak (<0.7) mode below the value of $\Delta\varphi/\varphi_J$ =0.1, which is supported by experiments and simulations of similar Brownian systems from the literature.

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