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A study of Force chain statistics in quasi-2D granular systems JIE ZHANG, Institute of Natural Sciences and Department of Physics, Shanghai Jiao Tong University, Shanghai 200240, China, LING ZHANG, YUJIE WANG, Department of Physics, Shanghai Jiao Tong University, Shanghai 200240, China, ROBERT ECKE, Center for Nonlinear Studies, Los Alamos National Laboratory, Los Alamos, NM 87545, USA, ROBERT BEHRINGER, Department of Physics, Duke University, Durham, NC 27708, USA — Force chains play a key role in the understanding of mechanical properties of granular materials. In this study, we have examined several statistical properties of force chains in a number of different granular systems using bi-disperse photo-elastic disks. These systems include vertical slabs of granular materials under the gravitational field, horizontal layers of granular materials under isotropic compression and under pure shear. Despite of drastically different protocols and processes used to generate these systems, we have found that there is a universal distribution of force chain length: they all obey exponential –like distributions. The exponential distributions can be explained using a diffusion-like argument. Despite the success of this argument, a fundamental question remains: how can force chains, which are "believed" to be *hyperbolic* in nature, have their lengths obey exponential distributions, which are intrinsically diffusion-like?

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