

Abstract Submitted
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Boltzmann's *stosszahlansatz* generalized for granular contact forces PHILIP METZGER, NASA, John F. Kennedy Space Center — Is there a valid way to generalize Boltzmann's *stosszahlansatz* (molecular chaos), the assumption that colliding molecules are not statistically correlated before the collision takes place, to the case of granular contact forces in a static packing? In thermal statistical mechanics the assumption produces a transport equation that obtains the density of single particle states and the Maxwell Boltzmann distribution. The problem in generalizing this to granular contact forces is that we must maintain the spatial symmetries of granular packing ensembles, which is not trivial. The essential trick is to sum the density of states over all particle exchanges, which destroys multi particle state information but maintains the distribution of single particle states. This summation transforms the equations into a generalized form of boson statistics. I will show that, in the summation, the first shell approximation of the fabric is transformed into the properly symmetric version of Boltzmann's *stosszahlansatz*. This produces a transport equation that obtains the density of single particle states and hence the distribution of granular contact forces. Granular simulation data will also be presented to validate the theory.

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