

# ***SEMINAR***

**Speaker:** **Prof. Stephan Koehler**

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**Title:** The drag and lift forces on vanes rotating in granular beds

**Date:** May 5<sup>th</sup>, 2006

**Time:** 12:00 pm

**Location:** Mason 142A

## **Abstract:**

We have developed a new rheological procedure to measure the forces acting on vanes which are rotating in monodisperse beds of glass beads. The vanes experience two forces, which are rotational drag (i.e. torque), and a lift force (i.e. an upwards force). The mean, averaged forces follow power-law trends that involve the immersion depth, vane geometry and bead diameter. The average torque on the vanes is similar to that predicted for rotating cylinders using critical-state theory, when the cylinder diameter is replaced by an effective vane diameter which also involves the bead diameter. The trends of the averaged lift forces resemble those on intruders slowly immersed into beds. We also examine the fluctuations of the forces, which have a random component that has a Gaussian distribution, and a periodic component that depends on the vane's height relative to the container bottom and on the glass bead diameter. In particular the random and periodic fluctuations of the lift are much more pronounced than those of the rotational drag.