Chemical decontamination of façade cracks MERLIN A. ETZOLD, JULIEN R. LANDEL, STUART B. DALZIEL, DAMTP, University of Cambridge — The problem of cleaning and decontamination of buildings arises in the context of chemical spillages, terrorist attacks, industrial applications and in day-to-day situations such as the removal of graffiti. A common feature of all buildings is the existence of cracks and fissures, which act as contaminant traps. This contribution reports experiments and modelling of the removal of a water-soluble contaminant from the bottom of an idealised V-shaped crack. The contaminant is dissolved in a polymer thickened droplet. The surface washing techniques commonly used in industrial decontamination induce a flow in the crack which is mostly controlled by the crack geometry. Rinsing with pure water is compared against the situation in which a neutralising chemical is present. The cleaning process is modelled by solving the time-dependent diffusion equation within the droplet coupled to the steady state advection-diffusion equation outside the droplet. This approach is similar to the work of Landel et al. on decontaminating plane surfaces beneath falling films [JFM (2016), vol. 789, pp. 630-668]. Our results indicate that the proposed model describes successfully the earlier stages of decontamination. In later stages the dissolution of the thickened matrix may contribute to the process.

Merlin A. Etzold
DAMTP, University of Cambridge

Date submitted: 29 Jul 2016
Electronic form version 1.4