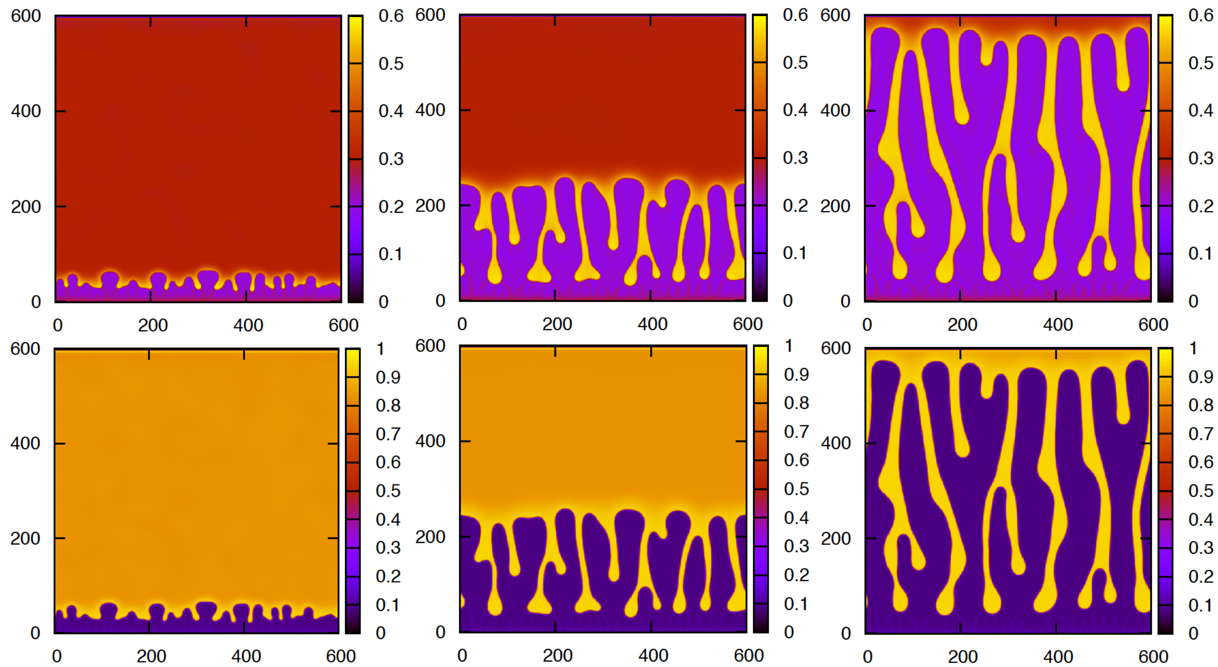

FIG. 5: (Colour online) Density profiles for the situation where the substrate is covered by nanoparticles with average density $\rho_n^{av} = 0.3$ and with the liquid excluded from the region $y < 0$. The top row shows the nanoparticle density profiles and bottom row the corresponding liquid density profiles at the times $t/t_l = 1000$ (left), 10000 (middle) and 30000 (right), where $t_l = 1/kTM_l^{\rm nc}\sigma^2$. The parameters are $kT/\varepsilon_{ll} = 0.8$, $\varepsilon_{nl}/\varepsilon_{ll} = 0.6$, $\varepsilon_{nn} = 0$, $\alpha = 0.2M_l^{\rm nc}\sigma^4$, $M_l^{\rm c} = 0$, $\rho_l(t = 0) = 0.9 \pm \xi$ (where ξ represents white noise of amplitude 0.05) and $(\mu - \mu_{\rm coex})/kT = -0.78$.

This theory allows us to study the time evolution of the evaporating film of nanoparticle suspension without some of the restrictions of the kinetic Monte Carlo model. Here, however, we illustrate its application in similar parameter regimes as used above for the KMC. We focus on two examples: (i) the spinodal dewetting of a initially flat film of nanoparticle suspension characterised by constant ρ_l and ρ_n (Fig. 4); and (ii) the retraction of a dewetting front that is unstable with respect to a fingering instability (Fig. 5).

Fig. 4 presents two pairs of snapshots from a purely evaporative dewetting process deep inside the parameter region of the phase diagram where spinodal dewetting occurs. For small times the film becomes unstable showing a typical spinodal labyrinthine pattern with a typical wavelength. The nanoparticles concentrate where the remaining liquid is situated. However, they are ‘slow’ in their reaction: when ρ_l already takes values in the range 0.08 – 0.83, the nanoparticle concentration has only deviated by about 25% from its initial value. The film thins strongly forming many