Universiteit Leiden
The Netherlands

Simulating Cosmic Reionisation

Pawlik, A.H.

Colour figures

This appendix contains a selection of figures from this thesis in full colour. A full colour version of the complete thesis is available electronically at http://proefschrift.leidenuniv.nl.

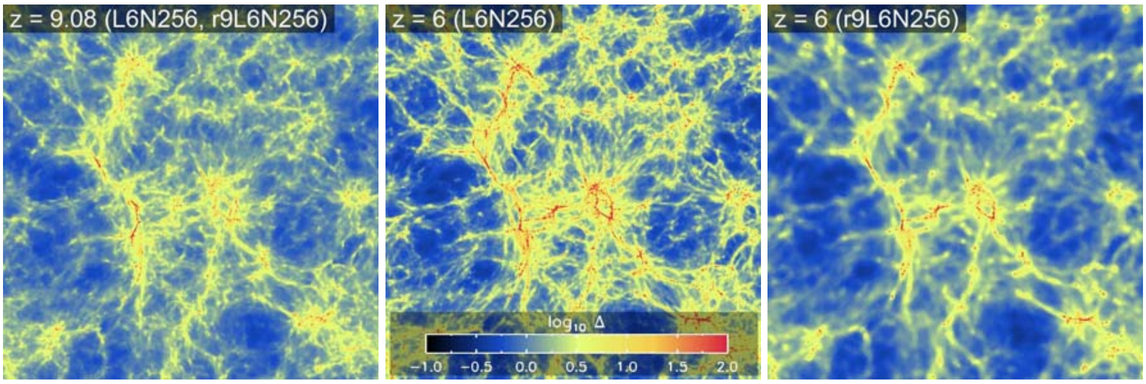

Figure 2: Identical to Fig. 2.2. Slices (of thickness $1.25\ h^{-1}$ comoving Mpc) through the centre of the simulation box, showing the SPH overdensity field in the simulations *L6N256* and *r9L6N256* at redshifts $z = 9.08$ (left-hand panel; where they are identical) and $z = 6$ (middle panel: *L6N256*, right-hand panel: *r9L6N256*). The inclusion of photo-heating in *r9L6N256* leads to a strong smoothing of the density field (right-hand panel).

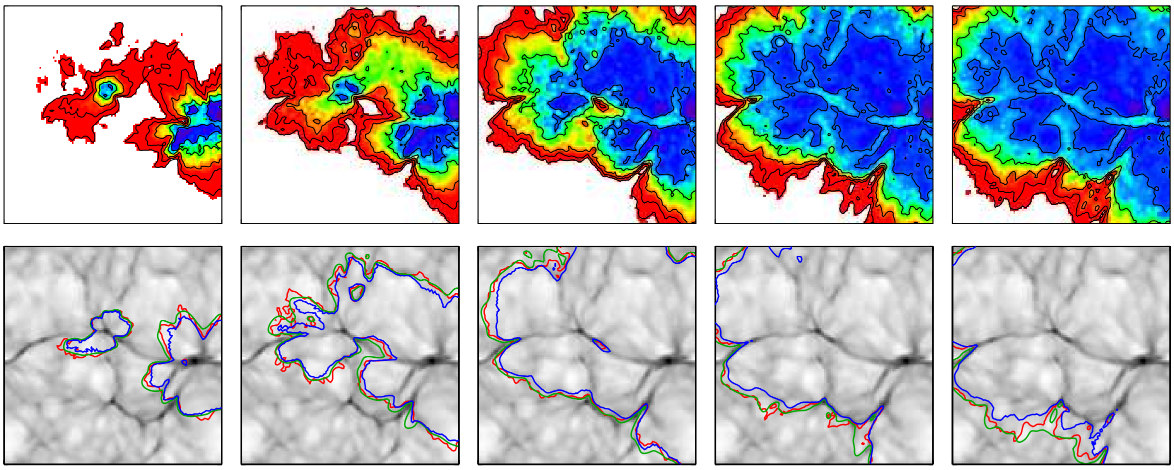

Figure 3: Identical to Fig. 5.15. Test 4: *Top row:* neutral fraction in a slice through $z = L_{\rm box}/2$ at times $t = 0.05, 0.1, 0.2, 0.3, 0.4$ Myr (from left to right). Contours show neutral fractions $\eta = 0.9, 0.5$, $\log\eta = -1, -3$ and -5, from the outside in. The colour scale is logarithmic and has a lower cut-off of $\eta = 10^{-7}$. It is identical to the colour scale used and shown in Fig. 7.19 of the corresponding test 7 in Chapter 7 (see Fig. 4 for a colour version). *Bottom row:* Density field in the slices shown in the top panels. Contours show ionisation fronts (neutral fraction of $\eta = 0.5$). Red contours show the results of our fiducial ($N_{\rm c} = 32, \tilde{N}_{\rm ngb} = 32$) simulation. For comparison, we show the results of C^2-RAY (green) and CRASH (blue). The agreement is excellent.

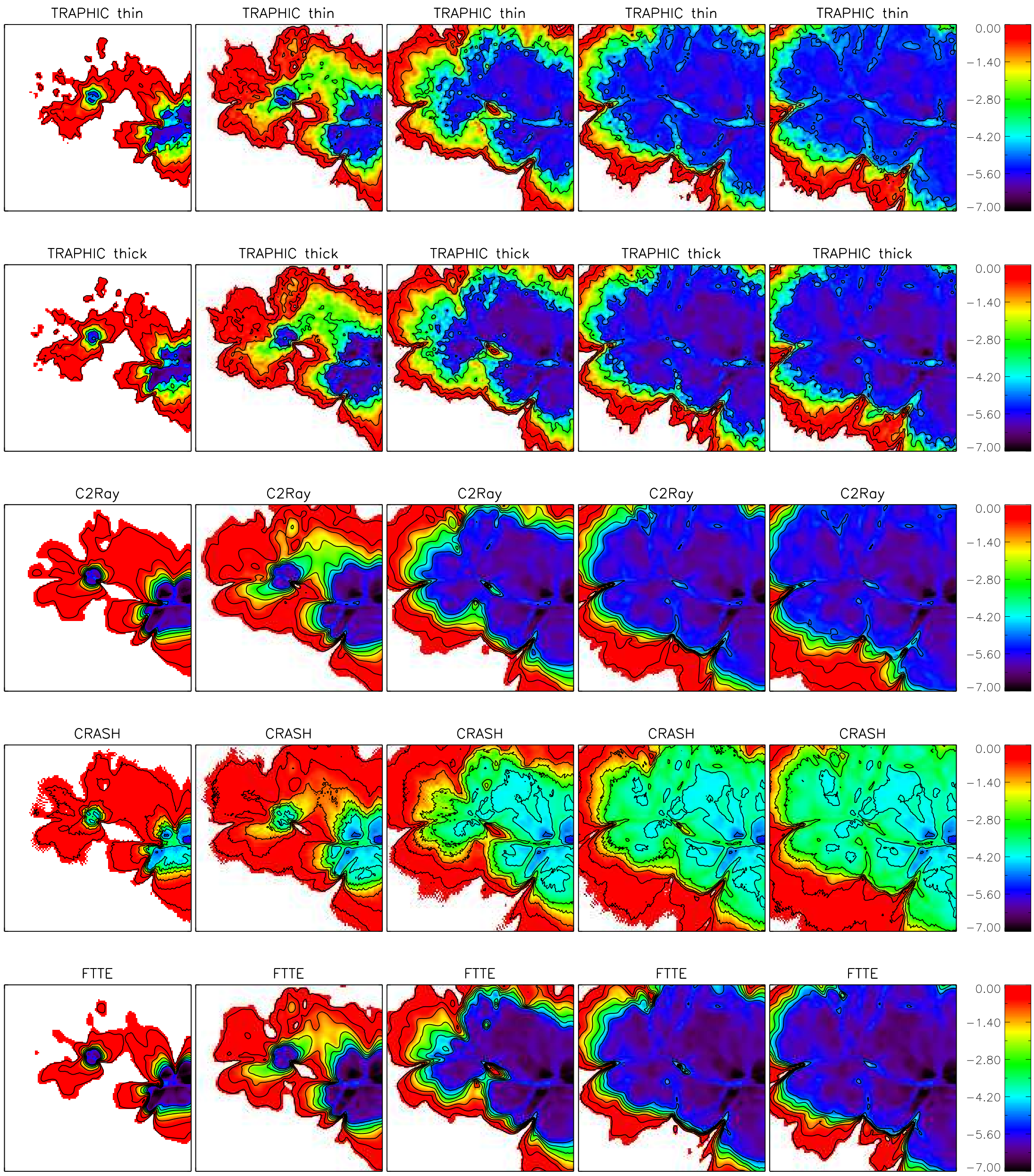

Figure 4: Identical to Fig. 7.19. Test 7: Neutral fraction in a slice through $z = L_{\rm box}/2$. *From left to right:* $t = 0.05, 0.1, 0.2, 0.3$ and 0.4 Myr. *From top to bottom:* TRAPHIC *thin* (assuming grey optically thin photo-heating rates), TRAPHIC *thick* (assuming grey optically thick photo-heating rates), $\rm C^2$-RAY, CRASH, FTTE. Contours show neutral fractions $\eta = 0.9, 0.5, \log \eta = -1, -3$ and -5, from the outside in. The colour scale is logarithmic and has a lower cut-off of $\eta = 10^{-7}$ (and hence is identical to that used in the top row panels of Fig. 5.15 in Chapter 5). The results obtained with TRAPHIC *thick* are in excellent agreement with those obtained with FTTE. They are also in excellent agreement with the results obtained with $\rm C^2$-RAY in highly ionised regions, where the neutral fraction is unaffected by spectral hardening. The small differences in the neutral fractions obtained with TRAPHIC *thick* and TRAPHIC *thin* are mostly due to differences in the recombination rate, caused by differences in the gas temperatures (see Fig. 7.21; see Fig. 5 for a colour version).

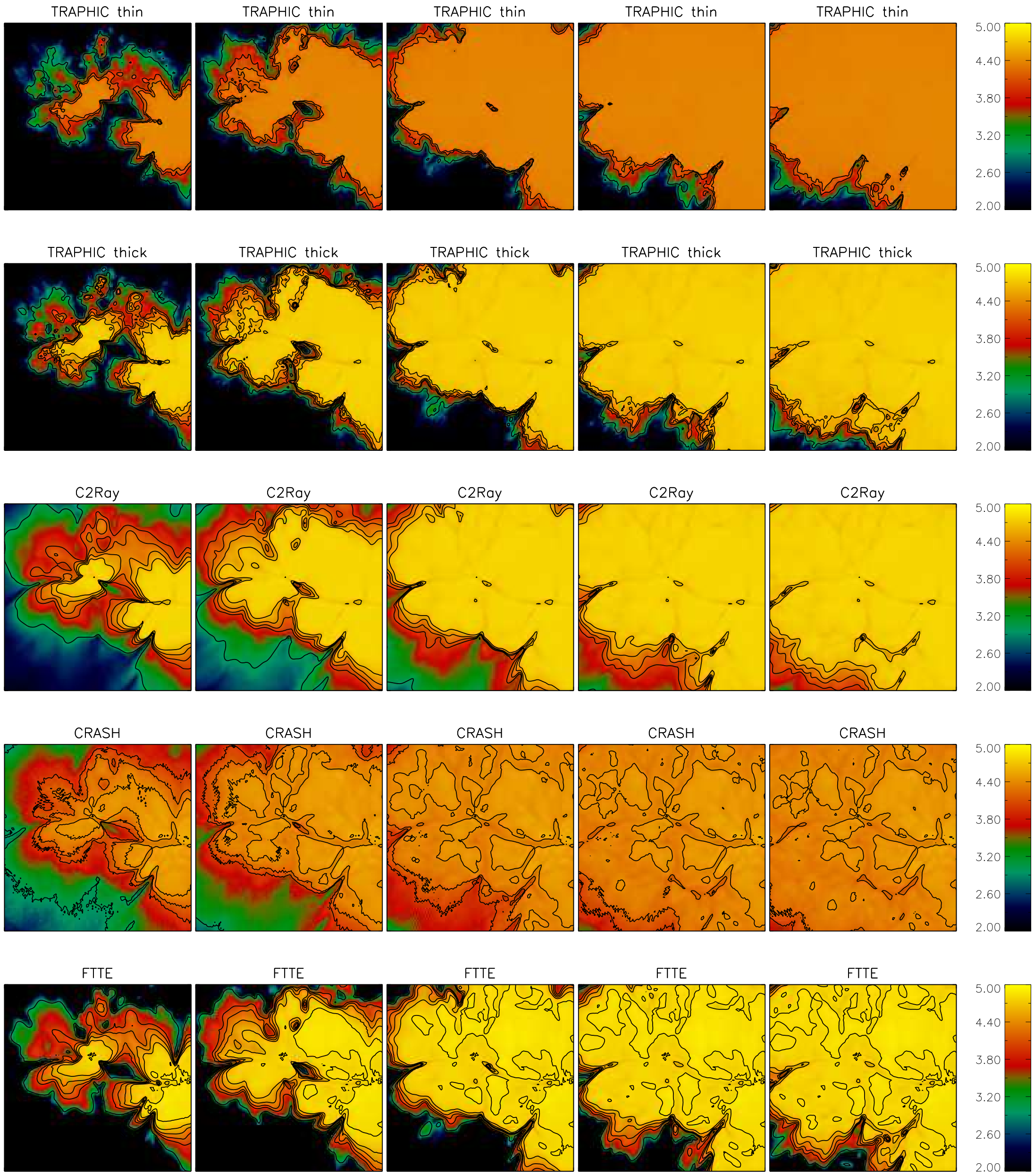

Figure 5: Identical to Fig. 7.21. Test 7: Temperature in a slice through $z = L_{\rm box}/2$. *From left to right:* $t = 0.05, 0.1, 0.2, 0.3$ and 0.4 Myr. *From top to bottom:* TRAPHIC *thin* (assuming optically thin photo-heating rates), TRAPHIC *thick* (assuming optically thick photo-heating rates), C^2-RAY, CRASH and FTTE. Contours show temperatures $\log_{10}(T\ [\mathrm{K}]) = 3, 4, 4.2, 4.4$ and 4.6, from the outside in. Most of the morphological differences may be attributed to differences in the spectral hardening of the ionising radiation (with the multi-frequency codes C^2-RAY and CRASH predicting a substantial amount of pre-heating and the monochromatic (grey) codes TRAPHIC and FTTE predicting sharp transitions between the hot ionised and the cold neutral phase), while the differences in the maximum gas temperatures are mainly due to photo-heating being computed in the optically thick limit (TRAPHIC thick, C^2-RAY, FTTE), the optically thin limit (TRAPHIC thin) or using multiple frequency bins (CRASH).