



Figure 9: Time to inject quarter of the total specified CO_2 volume for all cases in the pressure-constrained scenario. The dashed red line in the right plot denotes the targeted injection time of 7.5 year, and the red arrow points to the case shown in Figure 8.

injection point that a pressure build up has reached is reported for each realization to see the impact of heterogeneity and channellings on how the pressure wave travels through the medium.

Figure 8 shows the pressure and saturation responses for the two injection scenarios in a selected case. This case has one lobe, parallel rock-type stratigraphy (i.e., low aggradation angle), and up-dip progradation. It is faulted with open faults and has high barrier level. Responses for the rate constrained scenario are given in Figures 8a, 8b and 8c, and those for the pressure constrained scenario are given in Figures 8d, 8e and 8f.

The pressure build-up in Figures 8c and 8f tells about heterogeneity impact on maintaining the pressure locally rather than transferring it across the medium. Comparing Figures 8b and 8c with Figures 8e and 8f, we see that imposing a pressure constraint on the injector significantly reduces the pressure build-up in the medium (as should be expected). However, the pressure disturbance propagates widely through the system in both cases (Figures 8c and 8f), far beyond the CO_2 invaded zones in Figures 8a and 8d.

4.1 Injection time

In the pressure-constrained scenario, the less the injectivity of the well is, the longer it will take to inject into the medium, keeping the pressure below the critical limit. In some of the cases it takes longer than 100 years (i.e., longer than the considered total simulation time) to inject the specified CO_2 volume. To compare cases, we therefore calculate the time at which a quarter of the objective volume is injected. In all cases, this amount is injected within the total simulation time.

Figure 9 shows the injection time for all cases, using the pressure-constrained scenario. For many cases, the injector keeps the target rate, and thus, it completes the injection in