4.9.2 Generation IV fast reactors

Fast reactors have the advantage over thermal reactors that they can be configured to "burn" almost all the unstable, radioactive, fission products and therefore drastically reduce the fraction of these products in the spent nuclear fuel produced by Generation II LWRs. In this way the nuclear fuel cycle can be closed (see section 2.2). Alternatively they can be configured to produce more fuel than they consume. Given these potential advantages, three Generation IV fast reactors have received significant attention:

- GFRs or gas-cooled fast reactors that are helium-cooled and future evolutions of the GCR and HTGR (see section 4.6) continue to receive substantial design attention. The typical GFR with an outlet temperature of 850^oC is an evolution of the above-mentioned VHTR to a fast neutron spectrum and a more sustainable fuel cycle.

- The sodium-cooled reactor or SFR builds on the existing LMFBR technology aiming at improving the efficiency of uranium usage and closing the nuclear fuel cycle. It is designed to use as fuel any combination of uranium, plutonium or the "nuclear" waste of LWRs.

- As an alternative to the sodium-cooled reactor and the safety problems with sodium the lead-cooled fast reactor or LFR has received design attention. Typically the LFR would be of the pool type with outlet temperatures of the order of 550^oC-800^oC.