



**Figure 3.4** Residence time distribution curves for tanks-in-series model.<sup>6,7</sup>

### 3.3 Continuous Oscillatory Baffled Crystalliser

#### 3.3.1 Principles

Following the above discussions, if plug flow could be achieved under laminar flow, we would have the best of both worlds. NiTech’s continuous oscillatory baffled crystalliser (COBC) is one such device as shown in Figure 3.5. It consists of a tube with periodically spaced orifice baffles, superimposed with fluid oscillation. There are three key features for this type of system. Firstly, mixing is achieved by the generation and cessation of eddies. Each baffled cell acts as a CSTR; it is thus possible to have hundreds of “tanks” in series by simply arranging baffle cells in a serpentine fashion (Figure 3.5), leading to plug flow. Secondly, the mixing in the COBC is independent of net flow, so laminar flows can be operated, maintaining much longer residence times that cannot be achieved in turbulent flow systems. Lastly, the COBC allows well controlled mixing from plug flow to chaotic mixing conditions. There are various terminologies to be used in this chapter. In batch set up, OBC denotes oscillatory baffled crystalliser. When reactions are involved, it is an OBR, R stands for reactor. These apply to continuous set ups too with terminologies of COBC and COBR respectively. NiTech DN15 crystalliser is a COBC of 15 mm diameter (Figure 3.6). Figure 3.7 shows the residence time distributions (RTD) in a COBC, and the plug flow characteristics are clearly seen here. It must be noted that the shape of the RTD for plug flow must be in the form