

The lattice-ladder realization is illustrated in Fig. 12.17.

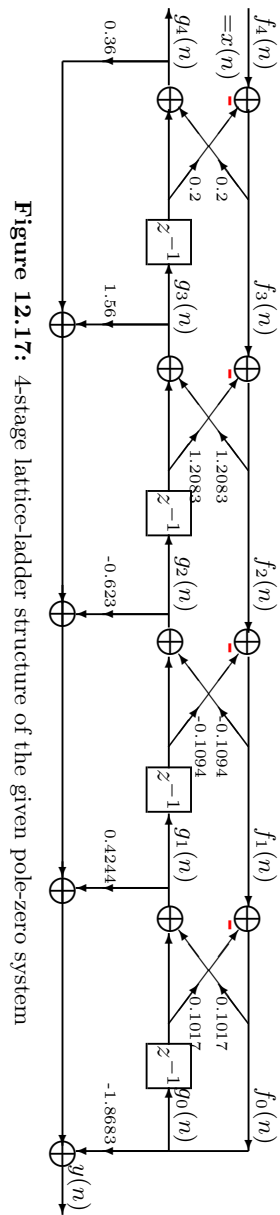


Figure 12.17: 4-stage lattice-ladder structure of the given pole-zero system

## 12.4 Exercises

1. Synthesize and draw the structures corresponding to the direct-forms, cascade, parallel and lattice implementations, respectively. Specify for

each system if it is stable or not. Next IIR systems are considered:

$$H_1(z) = \frac{3(1 - z^{-1})(1 + \sqrt{2}z^{-1} + z^{-2})}{(1 + 0.3z^{-1})(1 - 0.7z^{-1} + 0.49z^{-2})};$$

$$H_2(z) = \frac{\left(1 - 0.3e^{j\frac{\pi}{4}}z^{-1}\right)\left(1 - 0.3e^{-j\frac{\pi}{4}}z^{-1}\right)}{\left(1 - 0.6e^{j\frac{\pi}{6}}z^{-1}\right)\left(1 - 0.6e^{-j\frac{\pi}{6}}z^{-1}\right)} \frac{(1 + 0.7z^{-1} + 0.49z^{-2})}{(1 + 0.3696z^{-1} + 0.04z^{-2})};$$

$$H_3(z) = \frac{3}{1 - 1.27z^{-1} + 1.19z^{-2} + 1.18z^{-3} + 0.4z^{-4}};$$

$$H_4(z) = \frac{0.5 + 0.2z^{-1} - 0.3z^{-2} + z^{-3}}{1 - 0.3z^{-1} + 0.2z^{-2} + 0.5z^{-3}}.$$