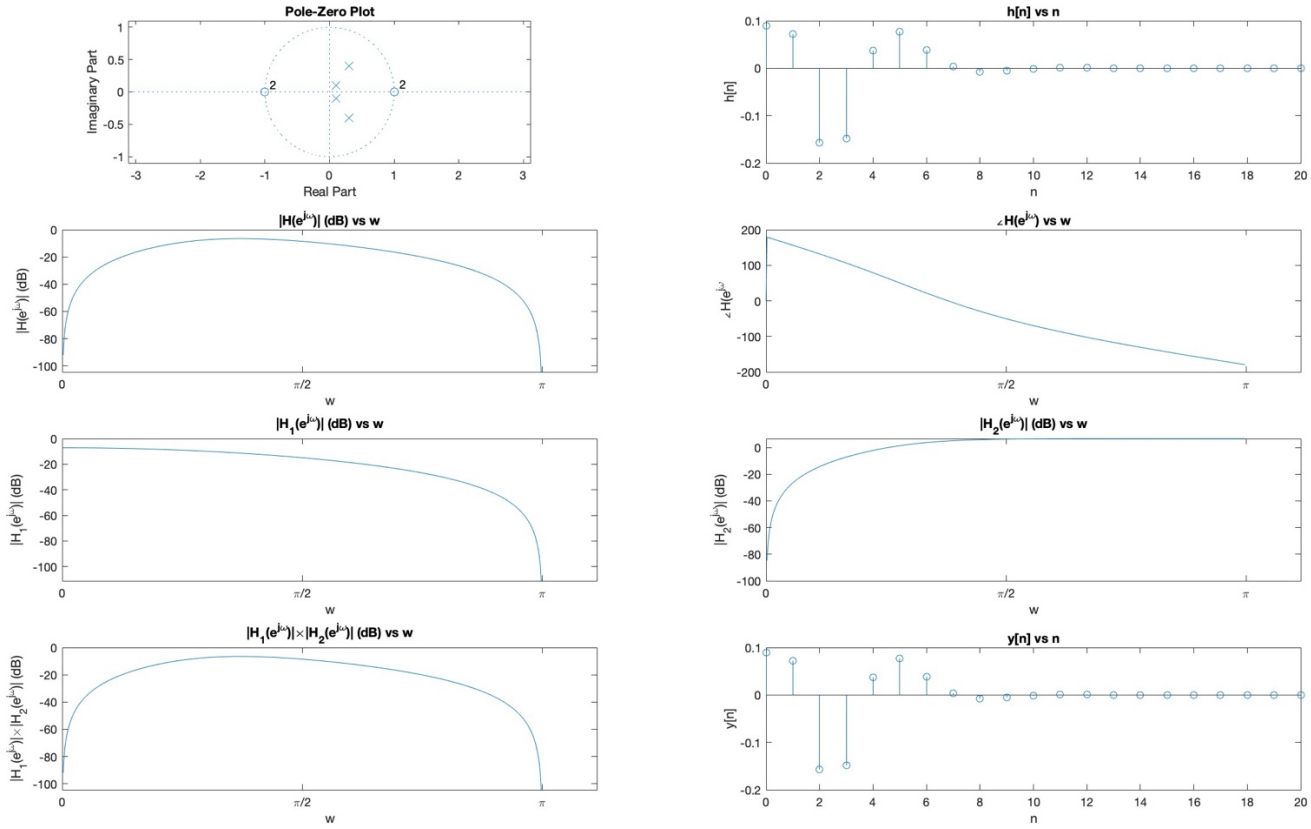
Matlab HW4

電機二 張牲源(B11901123)

5/20/2024

Result



8 Figures from (a)(b)(c)(e)(f)

(a) Since the system $H(z)$ is causal and LTI, with its outermost poles at $z = 0.3 \pm j0.4$, hence its ROC is $|z| > |0.3 \pm j0.4| = 0.5$.

(d) $H(z) = H_1(z)H_2(z) = \left(\frac{0.09+0.18z^{-1}+0.09z^{-2}}{1-0.2z^{-1}+0.02z^{-2}}\right)\left(\frac{1-2z^{-1}+z^{-2}}{1-0.6z^{-1}+0.25z^{-2}}\right)$

(e)(f) Verification

(1) Code

```
function compareFunctions (x1, x2)
    len = length(x1);
    identical = true;
    for i = 1:len
        if abs(x1(i)-x2(i)) > 1e-10
            identical = false;
            break;
        end
    end

    if identical
        disp("The functions are identical.")
    else
        disp("The functions are not identical.");
    end
end
```

(2) Comparing (c) and (e)

```
disp("Comparing (c) and (e)")
compareFunctions(mag2db(abs(H)), mag2db(abs(H1).*abs(H2)))
```

(3) Comparing (b) and (f)

```
disp("Comparing (b) and (f)")
compareFunctions(hn, yn)
```

(4) Comparison results

```
Comparing (c) and (e)
The functions are identical.

Comparing (b) and (f)
The functions are identical.
```

Using the verification code, it shows that the output of (c) and (e), (f) and (b) are identical up to a scale of 10^{-10}. Hence, we may conclude that the differences are negligible, and the results are identical.