گزارش تکلیف ساختار لتیس

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برای پیاد سازی روابط زیر:

$$G_{m-1}(z)=\frac{A_{m-1}(z)}{B_{m-1}(z)}=z^{-(m-1)}\frac{\tilde{B}_{m-1}(z)}{B_{m-1}(z)} \quad \Rightarrow \quad =\frac{z^{-m}\tilde{B}_m(z)-k_m^{*}B_m(z)}{B_m(z)-k_m z^{-m}\tilde{B}_m(z)}$$

هدف ما پیدا کردن:

$$B_{m-1}(z)=B_m(z)-k_m z^{-m}\tilde{B}_m(z)$$

$$\left(b_{m,m}-k_m b_{m,0}^{*}\right)=0\rightarrow k_m=\frac{b_{m,m}}{b_{m,0}^{*}} \qquad |k\_m|<1$$

تابع G(z):

$$G(z)=\frac{\frac{-0.005\cdot z^9+0.01\cdot z^8-0.02\cdot z^7+0.05\cdot z^6-0.1\cdot z^5+0.2\cdot z^4-0.3\cdot z^3+0.4\cdot z^2-0.5\cdot z+1.0}{z^9}}{1.0-\frac{0.5}{z}+\frac{0.4}{z^2}-\frac{0.3}{z^3}+\frac{0.2}{z^4}-\frac{0.1}{z^5}+\frac{0.05}{z^6}-\frac{0.02}{z^7}+\frac{0.01}{z^8}-\frac{0.005}{z^9}}$$

ظرایب ماتریس b:

$$b=[1,-0.5,0.4,-0.3,0.2,-0.1,0.05,-0.02,0.01,-0.005]$$

خود تابع $B_m(z)$:

$$1.0-\frac{0.5}{z}+\frac{0.4}{z^2}-\frac{0.3}{z^3}+\frac{0.2}{z^4}-\frac{0.1}{z^5}+\frac{0.05}{z^6}-\frac{0.02}{z^7}+\frac{0.01}{z^8}-\frac{0.005}{z^9}$$

محاسبه $\tilde{B}(z)=B^{*}\left(\frac{1}{z^{*}}\right)$:

```
#------> BTild(z)
BTild = sp.conjugate(Bz.subs(z, 1 / sp.conjugate(z)))
print(f'BTild:{BTild}')
```

خروجی:

$$\tilde{B}(z)=-0.005\cdot z^9+0.01\cdot z^8-0.02\cdot z^7+0.05\cdot z^6-0.1\cdot z^5+0.2\cdot z^4-0.3\cdot z^3+0.4\cdot z^2-0.5\cdot z+1.0$$

کد محاسبه km:

```
for m in range(Lm - 1, 0, -1):
    index = Lm - m - 1
    km_direct[index] = b_current[m] / b_current[0]
    K = km_direct[index]
    Bm_1 = Bz_current - K * z ** (-m) * BTild_current
    Bm_1 = sp.simplify(Bm_1)
    if m==1:
        pass
    else:
        print(Bm_1)


    #  b_current
    coeff_dict = Bm_1.as_coefficients_dict()
    exponents = []
    for term in coeff_dict.keys():
        if term == 1:
            exp = 0
        else:
            powers = term.as_powers_dict()
            exp = powers.get(z, 0)
        exponents.append(exp)

    exponents = sorted(exponents, reverse=True)
    b_current = []
    for exp in exponents:
        term = z ** exp
        coeff = coeff_dict.get(term, 0)
        b_current.append(coeff)
    b_current = np.array(b_current, dtype=np.float64)
    Bz_current = Bm_1
    BTild_current = sp.conjugate(Bz_current.subs(z, 1 / sp.conjugate(z)))
```

خروجی:

```
********************* Calculate Bm_1(z)  **********************
0.999975 - 0.49995/z + 0.3999/z**2 - 0.29975/z**3 + 0.1995/z**4 - 0.099/z**5 + 0.0485/z**6 - 0.018/z**7 + 0.0075/z**8
0.999918748593715 - 0.499814996624916/z + 0.399536240906023/z**2 - 0.299007481437036/z**3 + 0.198003712592815/z**4 - 0.09675
0.999715661576705 - 0.499166546521058/z + 0.39815738824234/z**2 - 0.296185643564356/z**3 + 0.193742425648824/z**4 - 0.091057
0.998242403106686 - 0.495670971490986/z + 0.390719905719913/z**2 - 0.284815518822568/z**3 + 0.178457757841498/z**4 - 0.07189
0.993064325736261 - 0.48281805478886/z + 0.370206871245106/z**2 - 0.256675019564806/z**3 + 0.142758454066238/z**4
0.972542013455762 - 0.445919610205901/z + 0.316987599085202/z**2 - 0.187267270931983/z**3
0.936482871252022 - 0.384882244437982/z + 0.231123803688242/z**2
0.879441558195325 - 0.289893375941492/z
```