```
MSE \\ E_Bode \\ \textbf{Algoritmos} \quad \textbf{BCRLS}
                                                                                                BCRLS MQE BCRLS MQE MQ MQR PSO (PSOM) (PSOM)
               MSE_{var}
MSE_{min} (%)
E_{Bode_{av}} (%)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1.456 \times 10^{-5} \\ 21.996
                                                                                                                                                                                2.178 \times 10^{-7} 7.389 \times 10^{-7}
                                                                                                                       11.682
                                                                                                                                                                                                        5.380
                                                                                                                                                                                                                                                                                                                                                                   8.259
                                                                                                                                                                                                                                                                                                                                                                                                                                                 9.474
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               9.474
                                                                                                                                                                                                                                                                                    5.357
                                                                                                                     45.856
                                                                                                                                                                                                                                                                                                                                                                41.787
                                                                                                                                                                                                    40.012
                                                                                                                                                                                                                                                                                  43.629
                                                                                                                                                                                                                                                                                                                                                                                                                                              43.602
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            43.601
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       111.020
              E_{Bode_{var}}(\%)
E_{Bode_{min}}(\%)
??
y(k)
                                                                                                                                                                                      5.260 \times 10^{0} \ 8.251 \times 10^{0}
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           7.247 \times 10^{3}
                                                                                                                                                                                                                                                                                    4.612
                                                                                                                                                                                                        4.201
                                                                                                                                                                                                                                                                                                                                                                   5.077
                                                                                                                                                                                                                                                                                                                                                                                                                                                 5.298
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               5.298
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             9.334
                                                                                                                          5.571
                 u(k)
                  y\left(k\right) = 2.14y(k-1) - 1.3049y(k-2) - 0.0963y(k-3) + 0.3467y(k-4) - 0.1097y(k-5) + 0.0105y(k-6) + 0.01u(k-1) + 0.0074u(k-1) +
 (1)
                MSE = \frac{\sum_{i=1}^{N_1} (y(i) - y_{estimated}(i))^2}{2}
                 y
??
yestimated
                \frac{\textit{Bode}_{phase} - \textit{Rbool}}{\textit{Bode}_{phase}}
                                                                                                                                                                                                                                                                                           -RBo\underline{de_{phase}}
                                                                                                                        \left. \frac{{}^{Bode}{}_{abs} - RBode_{abs}}{{}^{Bode}{}_{abs}} \right| +
(3)
                 Bode_{abs} RBode_{abs}
                 Bode_{phase}
                  RBode_{phase}
               E_{Bode}
N_2
Bode_{real}
               \begin{array}{l} D. \text{diacrea} \\ 1011 \\ ?? \\ J_{PSO} = \\ MSE \\ \phi_1 = \\ 0.3 \\ \phi_2 = \\ 0.4 \\ [-3,3] \\ \lambda_f = \\ 0.99 \\ 0.1 \\ \lambda_f = \\ 0.99 \\ 0.1 \\ 2? \end{array}
                Ā
0.9985
??
??
               New.epsReal and Simulated Output validation \\ New 2.eps Bode Plot validation \\ MSE_{av}
                 E_{Bode_{av}}
                MSE_{var}
                 E_{B o d e_{var}}
                 M\tilde{S}\tilde{E}_{min}^{var}(\%)
                 E_{Bode_{min}}(\%)
                Result_{min}(\%) = 100 - \frac{100 \times |MaxResult-Result_{min}|}{MaxResult}
 (4)
                  Result_{min}
                  egin{array}{l} Result \\ MaxResult \\ MSE \\ Bode \\ MSE_{av} \\ \end{array}
                 E_{Bodemin}
MPSO
MSE_{av}
```

 $\begin{array}{c} E_{Bodeav} \\ MSE_{min} \\ E_{Bodemin} \\ \phi_1 \end{array}$