В Micro-Cap была собрана схема ПИ-регулятора для объекта с передаточной функцией

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ПИ регулятор для Т=0

|  |  |  |  |
| --- | --- | --- | --- |
|  | K | T | E |
|  | 1.059084 | 12.899167 | 12.267 |
|  | 1.159084 | 12.899167 | 11.689 |
|  | 1.259084 | 12.899167 | 11.777 |
|  | 1.199084 | 12.899167 | 11.628 |
|  | 1.189084 | 12.899167 | 11.633 |
|  | 1.2 | 12.899167 | 11.627 |
|  | 1.3 | 12.899167 | 12.066 |
|  | 1.25 | 12.899167 | 11.725 |
|  | 1.225 | 12.899167 | 11.652 |
|  | 1.21 | 12.899167 | 11.629 |
|  | 1.201 | 12.899167 | 11.626 |
|  | 1.201 | 12.8 | 11.583 |
|  | 1.201 | 12.7 | 11.541 |
|  | 1.201 | 12.6 | 11.503 |
|  | 1.201 | 12.5 | 11.467 |
|  | 1.201 | 12 | 11.327 |
|  | 1.201 | 11 | 11.250 |
|  | 1.201 | 10.99 | 11.256 |
|  | 1.201 | 11.01 | 11.251 |
|  | 1.201 | 11 | 11.250 |
|  | 1.1 | 11 | 10.809 |
|  | 1.0 | 11 | 11.168 |
|  | 1.1 | 11 | 10.809 |
|  | 1.11 | 11 | 10.815 |
|  | 1.09 | 11 | 10.811 |
|  | 1.1 | 11 | 10.809 |
|  | 1.1 | 12 | 11.352 |
|  | 1.1 | 10 | 10.601 |
|  | 1.1 | 9 | 10.722 |
|  | 1.1 | 9.8 | 10.6 |
|  | 1.1 | 9.89 | 10.598 |
|  | 1.0 | 9.89 | 10.397 |
|  | 1.01 | 9.89 | 10.376 |
|  | 1.02 | 9.89 | 10.371 |
|  | 1.03 | 9.89 | 10.369 |
|  | 1.03 | 9 | 10.243 |
|  | 1.03 | 9.2 | 10.235 |

ПИ регулятор для Т=1.5

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | 0.818 | 15.707 | 19.184 |
|  | 0.82 | 15.707 | 19.137 |
|  | 0.9 | 15.707 | 17.441 |
|  | 1 | 15.707 | 16.077 |
|  | 1.1 | 15.707 | 16.045 |
|  | 1.2 | 15.707 | 18.096 |
|  | 1.15 | 15.707 | 16.841 |
|  | 1.12 | 15.707 | 16.308 |
|  | 1.11 | 15.707 | 16.160 |
|  | 1.1 | 15.707 | 16.045 |
|  | 1.1 | 15.8 | 16.185 |
|  | 1.1 | 15.6 | 16.148 |
|  | 1.1 | 15.69 | 16.154 |
|  | 1.1 | 15.71 | 16.166 |
|  | 1.1 | 15.707 | 16.045 |

ПИ регулятор для Т=3

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | 0.7 | 18.595 | 26.371 |
|  | 0.8 | 18.595 | 23.175 |
|  | 0.9 | 18.595 | 20.776 |
|  | 1 | 18.595 | 20.226 |
|  | 1.1 | 18.595 | 23.364 |
|  | 1.05 | 18.595 | 21.362 |
|  | 1.02 | 18.595 | 20.559 |
|  | 1.01 | 18.595 | 20.367 |
|  | 1 | 18.595 | 20.226 |
|  | 1 | 18.6 | 20.369 |
|  | 1 | 18.5 | 20.350 |
|  | 1 | 18.58 | 20.373 |
|  | 1 | 18.595 | 20.226 |

ПИД регулятор для Т=0

|  |  |  |  |
| --- | --- | --- | --- |
|  | K | T | e |
|  | 1.4 | 7.7395 | 6.715 |
|  | 1.3 | 7.7395 | 6.581 |
|  | 1.2 | 7.7395 | 6.615 |
|  | 1.29 | 7.7395 | 6.560 |
|  | 1.29 | 7.8 | 6.569 |
|  | 1.29 | 7.7 | 6.558 |
|  | 1.29 | 7.6 | 6.526 |
|  | 1.29 | 7.5 | 6.545 |
|  | 1.29 | 7.6 | 6.526 |
|  | 1.285 | 7.6 | 6.515 |
|  | 1.284 | 7.6 | 6.508 |

ПИД регулятор для Т=1.5

|  |  |  |  |
| --- | --- | --- | --- |
|  | К | Т | Е |
|  | 0.8185 | 15.7 | 19.185 |
|  | 0.9 | 15.7 | 17.450 |
|  | 1.0 | 15.7 | 16.377 |
|  | 1.01 | 15.7 | 16.553 |
|  | 0.99 | 15.7 | 16.283 |
|  | 0.95 | 15.7 | 16.542 |
|  | 0.98 | 15.7 | 16.252 |
|  | 0.981 | 15.7 | 16.236 |
|  | 0.981 | 15.6 | 16.110 |
|  | 0.981 | 15.5 | 15.975 |
|  | 0.981 | 15.4 | 15.844 |
|  | 0.981 | 15.3 | 15.709 |
|  | 0.981 | 15 | 15.359 |
|  | 0.981 | 14 | 14.274 |
|  | 0.981 | 13 | 13.250 |
|  | 0.981 | 12 | 12.236 |
|  | 0.981 | 11 | 11.218 |
|  | 0.981 | 10 | 10.230 |
|  | 0.981 | 8 | 8.806 |
|  | 0.981 | 7 | 8.996 |
|  | 0.981 | 7.5 | 8.769 |
|  | 0.981 | 7.51 | 8.773 |
|  | 0.981 | 7.49 | 8.785 |
|  | 0.981 | 7.5 | 8.769 |
|  | 0.983 | 7.5 | 8.780 |
|  | 0.98 | 7.5 | 8.753 |
|  | 0.979 | 7.5 | 8.762 |
|  | 0.98 | 7.5 | 8.753 |
|  | 0.98 | 7.55 | 8.749 |

ПИД регулятор для Т=3

|  |  |  |  |
| --- | --- | --- | --- |
|  | К | Т | Е |
|  | 0.7 | 18.595 | 26.424 |
|  | 0.8 | 18.595 | 23.541 |
|  | 0.81 | 18.595 | 23.617 |
|  | 0.79 | 18.595 | 23.620 |
|  | 0.8 | 18.595 | 23.541 |
|  | 0.799 | 18.595 | 23.552 |
|  | 0.799 | 18.5 | 23.385 |
|  | 0.799 | 18.501 | 23.390 |
|  | 0.799 | 18.499 | 23.379 |
|  | 0.799 | 18.4 | 23.205 |
|  | 0.799 | 18.3 | 23.048 |
|  | 0.799 | 18 | 22.596 |
|  | 0.799 | 17 | 21.270 |
|  | 0.799 | 14 | 17.532 |
|  | 0.799 | 10 | 12.541 |
|  | 0.799 | 8 | 10.784 |
|  | 0.799 | 7 | 11.613 |
|  | 0.799 | 7.5 | 10.930 |
|  | 0.799 | 7.8 | 10.890 |
|  | 0.799 | 7.9 | 10.782 |
|  | 0.79 | 7.9 | 10.815 |
|  | 0.8 | 7.9 | 10.780 |
|  | 0.81 | 7.9 | 10.806 |
|  | 0.8 | 7.9 | 10.780 |
|  | 0.8 | 7.91 | 10.777 |
|  | 0.8 | 7.92 | 10.776 |