**1.)**

**Graph 1.** Response (displacement) of the system according to constant average acceleration (left) and linear acceleration (right) variation cases.

**Graph 2.** Response (velocity) of the system according to constant average acceleration (left) and linear acceleration (right) variation cases.

**Graph 3.** Response (acceleration) of the system according to constant average acceleration (left) and linear acceleration (right) variation cases.

Tables show the results obtained for the system using both constant average acceleration and linear acceleration variations (These can also be seen on related graphs). Responses of the system (t=30 seconds):

i.) Constant average acceleration

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Time(sec)** | **u** | **∆u** | **ú** | **∆ú** | **ü** | **∆ü** | **F** | **∆F** | **∆Fˆ** |
| 30 | -1,1E-05 | -1,6E-07 | 4,06E-06 | 1,12E-05 | 0,00011 | -5,6E-06 | 0 | 0 | -0,00066 |

ii.) Linear acceleration

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Time(sec)** | **u** | **∆u** | **ú** | **∆ú** | **ü** | **∆ü** | **F** | **∆F** | **∆Fˆ** |
| 30 | -9,7E-06 | 1,11E-06 | 1,57E-05 | 9,59E-06 | 8,73E-05 | -1,7E-05 | 0 | 0 | 0,006966 |

If we compare results, there are differences between all responses of the system for both constant average and linear accelerations. First of all, the displacement in linear acceleration variation case is slightly greater than other. For velocity, linear acceleration variation is prevailing one. Its velocity is almost four times the velocity of the constant average variation. And finally, the acceleration of constant average variation case is greater than other one.

**2.)** Maximum responses of system (u: maximum displacement, ú: maximum velocity, ü: maximum acceleration):

i.) Constant average acceleration

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Time(sec)** | **u** | **∆u** | **ú** | **∆ú** | **ü** | **∆ü** | **F** | **∆F** | **∆Fˆ** |
| 0,1 | 0,021053 | 0,002995 | 0,629546 | 0,061146 | 12,53875 | 0,619062 | 22,2 | 1,11 | 838,987 |

ii.) Linear acceleration

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Time(sec)** | **u** | **∆u** | **ú** | **∆ú** | **ü** | **∆ü** | **F** | **∆F** | **∆Fˆ** |
| 0,1 | 0,021027 | 0,002994 | 0,629548 | 0,061146 | 12,53878 | 0,619063 | 22,2 | 1,11 | 1257,939 |

Maximum responses of the system are obtained for both variation cases. When we check results, we can easily say that values are almost wholly same, except one or two last digit number(s).

*~All calculations were made on Microsoft Excel.~*