Earthquake engineering homework4

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In this nonlinear dynamic SDOF system problem, we know that：

mass = 1 (kip\*s2/inch)

zeta = 0.05

stiffness 1 (k1) = 631.65 (kip/inch)

stiffness 2 (k2) = 126.33 (kip/inch)

yielding displacement (xy) = 1 (inch)

initial displacement x0 = 0 (inch)

initial velocity 0 = 40 (inch/s)

the unit time interval of analyzing the problem Δt = 0.005 (s)

use Average Acceleration Method to calculate the response of the system.

1. (t)

一張含有 文字, 螢幕擷取畫面, 行, 圖表 的圖片

AI 產生的內容可能不正確。

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一張含有 文字, 行, 螢幕擷取畫面, 繪圖 的圖片

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1. (x)

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AI 產生的內容可能不正確。

1. List the first six steps of problem analyzing process:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| time | u | v | a | Fs |
| 0 | 0 | 40 | -100 | 0 |
| 0.005 | 0.197981 | 39.34622 | -223.025 | 125.0548 |
| 0.01 | 0.391184 | 38.08298 | -341.515 | 247.0913 |
| 0.015 | 0.576629 | 36.23523 | -453.655 | 364.2277 |
| 0.02 | 0.751484 | 33.83684 | -557.747 | 474.6748 |
| 0.025 | 0.913106 | 30.93 | -652.233 | 576.7632 |
| 0.03 | 1.059081 | 27.56448 | -735.718 | 639.1137 |

1. List the specific point where the nonlinear property needs to be corrected.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Point | time | u(t) | v(t) | a(t) | Fs |
| a | 0.025 | 0.912948 | 30.917828 | -652.6337 | 639.0855 |
| 0.03 | 1.058858 | 27.550362 | -736.0721 |
| b | 0.065 | 1.59996 | 3.121052 | -710.8935 | 708.2943 |
| 0.07 | 1.6067 | -0.429497 | -707.7585 |
| c | 0.17 | -0.33723 | -15.102896 | 553.5855 | -562.7746 |
| 0.175 | -0.4056 | -12.289964 | 589.5885 |
| d | 0.195 | -0.53548 | -0.682877 | 579.9451 | -578.7008 |
| 0.2 | -0.53167 | 2.212186 | 576.2149 |
| e | 0.295 | 0.965788 | 15.240678 | -402.4071 | 449.9758 |
| 0.3 | 1.036715 | 13.179272 | -441.9029 |
| f | 0.34 | 1.965924 | 31.688055 | 440.2102 | 580.4541 |
| 0.345 | 2.129723 | 33.860229 | 417.1085 |