A study on dynamic absorber with two pendulums(balls) mounted on tilted vibrating system

2003 Fiscal Year Final Research Report Summary

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Research Project

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14550213

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

Dynamics/Control

Research Institution

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Keywords

dynamic vibration absorber / two-pendulums / roller / tilted vibration system / parametric excitation / optimization

Research Abstract

On developing a dynamic absorber consisting of two pendulums (vertical : parametrically excited, horizontal : resonated) which is effective for vibration of a structure in both vertical and horizontal directions, analytical and experimental studies are performed. The system where the two pendulums are replaced by balls (rollers) is also investigated. In this study the following results are obtained.
1)Nonlinear equation of motion is developed for the tilted single DOF system subjected to excitation in tilted direction.
2)A scheme for obtaining the optimum damping ratio is suggested where overall frequency response of the system can be minimized. The optimum damping ratio and corresponding frequency response is calculated numerically for several tilted angle, and the results show that proposed dual pendulum-type dynamic absorber is effective for vibration control. Moreover, the experimental investigation shows good correspondence with numerical tests.
3)Equation of motion for the tilted vibration system with roller-type dynamic absorber is developed, where the slip between roller and guide is considered, Both numerical and experimental tests show that the roller type absorber represents similar damping effect as the pendulum system. Investigating performance of roller type damper with optimal damping remains to be tested due to the difficulty in placing damping mechanism for the roller motion experimentally, however, the compactness of the suggested system provides compact implementation and good performance at fixed frequency excitation.

Research Products (6 results)

All | Other

All | Publications (6 results)

[Publications] 佐藤秀紀, 岩田佳雄, 小松崎俊彦, 荘 義林, 山田崇史, 小川孝吉: "二振子動吸振器による傾斜振動系の制振特性"日本機械学会北陸信越支部第40期総会・講演会講演論文集. 175-176 (2003)

[Publications] 山田崇史, 佐藤秀紀, 岩田佳雄, 栄義林, 小松崎俊彦, 小川孝吉: "二振子動吸振器による傾斜振動系の制振"日本機械学会北陸信越支部第41期総会・講演会講演論文集. 177-178 (2004)

[Publications] 宋義林, 佐藤秀紀, 岩田佳雄, 小松崎俊彦: "二つのローラを利用した動吸振器による傾斜振動系の制振"日本機械学北陸信越支部第41期総会・講演会講演論文集. 175-176 (2004)

[Publications] Hidenori Sato, Yoshio IWATA, Toshihiko omatsuzaki, et al.: "Vibration control of tilted vibration system by two pendulums type dynamic vibaration absorber."Proceeding of Hokuriku-Shinetsu branch of JSME. 37-1. 175-176 (2003)

[Publications] Hidenori Sato, Yoshio IWATA, Toshihiko omatsuzaki, et al.: "Vibration reduction of tilted vibration system using two pendulums type vibration absorber."Proceeding of Hokuriku-Shinetsu branch of JSME. 47-1. 177-178 (2004)

[Publications] Hidenori Sato, Yoshio IWATA, Toshihiko omatsuzaki, et al.: "Vibration Suppression of tilted Vibration System by Dynamic Vibration Absorber."Proceeding of Hokuriku-Shinetsu branch of JSME. 47-1. 175-176 (2004)

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