

## Accepted Manuscript

The determination and enhancement of compliant modes for actuation in structural assemblies

James Bird, Matthew Santer, Jonathan Morrison

PII: S0020-7683(16)30323-7  
DOI: [10.1016/j.ijsolstr.2016.11.006](https://doi.org/10.1016/j.ijsolstr.2016.11.006)  
Reference: SAS 9358



To appear in: *International Journal of Solids and Structures*

Received date: 29 July 2016  
Revised date: 21 October 2016  
Accepted date: 2 November 2016

Please cite this article as: James Bird, Matthew Santer, Jonathan Morrison, The determination and enhancement of compliant modes for actuation in structural assemblies, *International Journal of Solids and Structures* (2016), doi: [10.1016/j.ijsolstr.2016.11.006](https://doi.org/10.1016/j.ijsolstr.2016.11.006)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# The determination and enhancement of compliant modes for actuation in structural assemblies

James Bird<sup>a,\*</sup>, Matthew Santer<sup>a</sup>, Jonathan Morrison<sup>a</sup>

<sup>a</sup>*Department of Aeronautics, Imperial College London  
Prince Consort Road, London. SW7 2AZ, UK*

---

## Abstract

Linear algebra methods for determining modes of kinematic and static indeterminacy in jointed frames are extended to reveal modes of compliance in otherwise rigid assemblies. These modes are extracted from a structural model, based on finite elements, via a singular value decomposition and yield the ways in which a structure can be most easily deformed. This modal approach also allows for the formulation of a reduced-order structural model, whereby relevant modes are selected and used as the basis for the optimisation of a compliant structure. The method detailed is shown to be a useful design tool, demonstrated by its application to a structure based on the Kagome lattice geometry. For certain frameworks, first order effects produce tightening under actuation. As a result, a scheme to adjust the modes to take nonlinear effects into account is also given.

*Keywords:* Adaptive structures, Kagome lattice, SVD

*2010 MSC:* 00-01, 99-00

---

---

\*Corresponding author  
Email address: j.bird12@imperial.ac.uk (James Bird)

Download English Version:

<https://daneshyari.com/en/article/4922641>

Download Persian Version:

<https://daneshyari.com/article/4922641>

[Daneshyari.com](https://daneshyari.com)