THE DECOUPLING OF LINEAR SYSTEMS

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The purpose of this presentation is to report on the development of a method and algorithm to decouple any linear system. To be specific, let **A**, **B** and **C** be arbitrary square matrices of the same order with at least one of the matrices, say **A**, being nonsingular. An invertible transformation is developed to convert $\mathbf{A}\ddot{\mathbf{q}} + \mathbf{B}\dot{\mathbf{q}} + \mathbf{C}\mathbf{q} = \mathbf{f}(t)$ into $\ddot{\mathbf{p}} + \mathbf{D}\dot{\mathbf{p}} + \boldsymbol{\Omega}\mathbf{p} = \mathbf{g}(t)$ for which **D**, $\boldsymbol{\Omega}$ are diagonal. The decoupling procedure is an extension of classical modal analysis, which is a time-honored method for decoupling linear dynamical systems that are either undamped or classically damped.