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|  | **Jacobian** | **Modal decomposition** | **Singular Value Decomposition** |
| **Philosophy** | Topology-based decoupling | Physics-based decoupling | Data driven-based decoupling |
| **Requirements** | Accurate knowledge of the geometry and the frame of reference about which the Jacobians are evaluated | Knowledge of the physics of the plant and system parameters like mass, stiffness and damping matrices | Knowledge of the plant transfer function matrix, which can be obtained experimentally |
| **Decomposition** |  |  |  |
| **Method** | Vector multiplication | Eigenvalue decomposition | Singular value decomposition (SVD) |
| **Operation matrix** | Frequency dependent complex plant transfer matrix | Frequency independent real matrix | Real-approximation of the complex plant matrix at the decoupling frequency |
| **Matrix type** | Complex rectangular/square | Real square | Real rectangular/square |
| **Transformation vectors** | Jacobians in actuator and sensor space | Eigenvectors | Singular vectors |
| **Physical interpretation of the transformation vectors** | Transformation of the velocity in the local frame to the fame in which Jacobian is evaluated | Directions of the different modes of the system | Directions of the maximum and minimum singular values |
| **Decoupling** | Centre of stiffness frame: Decoupling in the low frequency region | Decoupling in entire frequency band | Decoupling frequency can be chosen in the desired frequency band of interest |
| Centre of mass frame: Decoupling in high frequency region |
| **Mathematical complexity for decomposition** | (I don’t have any idea on this) |  |  |
| **Controller implementation** |  |  |  |
| **Control effort for similar performance on Gravimeter model** |  |  |  |
| **Robustness** |  |  |  |
| **Applicability** | Applicable for small motions (Since, Jacobian approximation is valid for small motion) | Applicable only to systems whose dynamics/governing equation can be expressed using mass, stiffness and damping matrices | Applicable to systems whose complete transfer matrix can be obtained experimentally (or numerically ) |