

emgr

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Reduced Basis Summer School 2014 (Software Shorts)

emgr - **EM**pirical **GR**amian Framework

- Version 2.2
- DOI: 10.5281/zenodo.10275
- Open-Source (BSD 2-Clause-License)
- Compatible with
 - Octave
 - Matlab
 - (FreeMat)
- About 400 LoC
- No Toolbox / Package Dependencies

Capabilities

- Empirical Controllability Gramian
- Empirical Observability Gramian
- Empirical Cross Gramian
- Empirical Linear Cross Gramian
- Empirical Sensitivity Gramian
- Empirical Identifiability Gramian
- Empirical Joint Gramian

Application

- Model Order Reduction
 - State Reduction
 - Robust Reduction
 - Parametric Reduction
 - Parameter Reduction
 - Combined Reduction
- Parameter Identification
- Sensitivity Analysis
- Decentralized Control
- Uncertainty Quantification
- Control Systems
 - First- & Second-Order
 - Linear & Nonlinear
 - Parametrized
- Discretized PDEs

Interface

Minimal Usage:

```
W = emgr(f,g,q,t,w);
```

General Usage:

```
W = emgr(f,g,q,t,w,pr,nf,ut,us,xs,um,xm,yd);
```

Features

Implementation:

- Uniform Interface
- Designed like an App
- Adaptable Solver Backend
- Only Matrix and Vector Operations
- Accelerated by Generalized Transpositions

Performance:

- Vectorized
- Implicit Parallelization
- Explicit Parallelization Hints
- Profiled
- Benchmarked

Links

Listings:

- Github:
<http://github.com/gramian/emgr>
- Matlab Fileexchange:
<http://mathworks.com/matlabcentral/fileexchange/40169-emgr-empirical-gramian-framework>

Community Listings:

- MoRePaS:
<http://www.morepas.org/software/index.html>
- MORwiki:
<http://morwiki.mpi-magdeburg.mpg.de/morwiki/index.php/Emgr>

Reviewed Listings:

- Oberwolfach References on Mathematical Software:
<http://orms.mfo.de/project?id=345>
- swMath:
<http://swmath.org/software/7554>

emgr - Empirical Gramian Framework

Download | Documentation | Demos

<http://gramian.de>

Thanks!