

Timeline of SVD in MKL, Matlab, Mathematica, or  
Behaviour of MKL, Matlab, Mathematica in different time and for different matrix size.

| code \ MKL version |                  | 10.3.0                        | 11.1.1          | 11.2.2          | 11.3.1 / 11.3.2 | 2017.0.1 | 2017.0.31 | 2018.0.1 | 2018.0.3 |
|--------------------|------------------|-------------------------------|-----------------|-----------------|-----------------|----------|-----------|----------|----------|
| dgesvd             | n=2500           | dgebrd + dbdsqr<br>same above | dgebrd + dbdsqr |                 |                 |          |           |          |          |
|                    | n=2501           |                               | dgerdb + dbdsqr |                 |                 |          |           |          |          |
| dgesdd             | n=2500           | dgebrd + dbdsdc<br>same above | dgebrd + dbdsdc | dgebrd + dbdsdc |                 |          |           |          |          |
|                    | n=2501           |                               | dgerdb + dbdsdc | same above      |                 |          |           |          |          |
| Matlab             | rank() via       |                               | dgesvd          |                 |                 |          | dgesdd    |          |          |
|                    | version          |                               | 2015b           | ??              | 2016b - 2017b   |          | 2018a     | 2018b    | 2019a    |
| Mathematica        | MatrixRank[] via | dgesdd                        |                 | dgesdd          |                 |          |           |          |          |
|                    | version          | 8.0                           |                 | 10.3.0          | 11.0.1          | 11.3.0   | dgesdd    |          |          |
|                    |                  |                               |                 |                 |                 |          |           |          |          |

dbdsdc{dlasdq{dbdsqr}}

| MKL 2018.0.3 | dgemm | dgesdd |        | sgesvd |      |
|--------------|-------|--------|--------|--------|------|
| nCPU         | 2500  | 2500   | 2501   | 2500   | 2501 |
| 1            |       | 6.131  | 6.391  |        |      |
| 1/4          |       | 8.894  | 9.194  |        |      |
| 1/10         |       | 18.232 | 18.711 |        |      |
| 1/20         |       | 6.155  | 6.349  |        |      |

| MKL 2018.0.3 | dgemm | dgesdd |       |        | sgesvd |       |        |
|--------------|-------|--------|-------|--------|--------|-------|--------|
| nCPU         | 2500  | 2500   | 2501  | 5000   | 2500   | 2501  | 5000   |
| 1            |       | 6.131  | 6.391 |        | 6.138  | 3.219 | 22.163 |
| 4            |       | 2.058  | 2.132 |        | 1.722  | 1.335 | 7.751  |
| 10           |       | 1.105  | 1.176 |        | 1.085  | 0.817 | 4.232  |
| 2x10         |       | 0.921  | 0.962 | 10.689 | 0.884  | 0.872 | 3.510  |

2x E5-2690 v2