

Denis Pleshkov

(Senior) C++ Developer

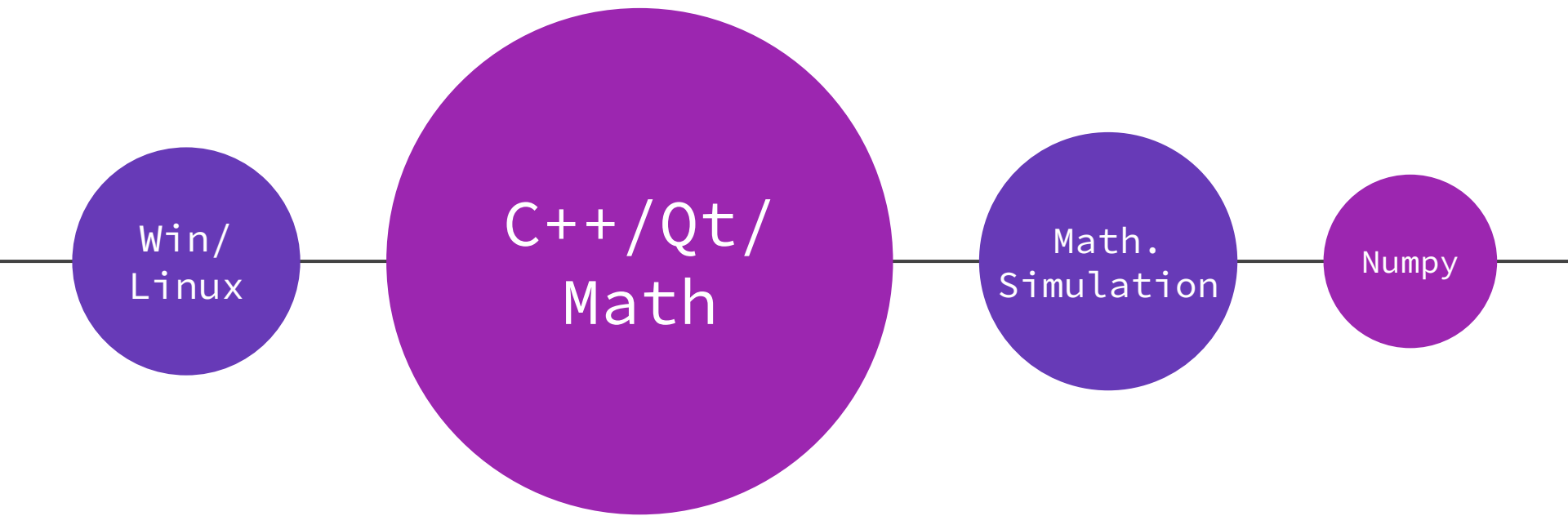
About me

I do love designing and implementing a cool/complex things that could simplify my and others' work. Negotiate and implement.

More than 10 years of production experience with C++/Qt.

Hobby: Linear Algebra, Linear ODE, FEA, Vibration Theory, bike riding, Control Theory, Rubik's cube, drum playing

Knowledge



AD for OEM from Munich

Project name: NDA (Aug2021-now)

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- Low level functionality for data transfer between ECU's and HeadUnit (FrancaIDL/AutoSAR)
- Math.Library: Common Wrapper, Linear Algebra, Optimization, Kalman Filtration, Rectangles Intersection in 2D
- Found error in Intel AdLib
(https://en.wikipedia.org/wiki/Hungarian_algorithm)
- Tech. stack: C++14/Python (Numpy, Jupyter), Bazel/FrancaIDL/Blaze/AdLib, vsCode



HMI for OEM from Stuttgart

Project name: NDA (Jan2016-Aug2021)

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- Rich GUI for HMI/Navigation
- Instrument Cluster display (no simulator, no debug, only dlt-logs)
- Virtual keyboard
- Check translation files (Kotlin)
- Tech. stack: C++14/Qt/Qml/C#/cmake/dlt-viewer, Qt Creator



TeamCenter's plugin

Project name: Digital signature (Dec2013-Dec2015)

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- Secured document's flow with digital signature
- Plugin for TeamCenter
(<https://www.plm.automation.siemens.com/global/en/products/teamcenter>)
- Tech.stack: Java, JNI, C++, Qt, QtCreator/Eclipse
- 3rd-party Crypto-Lib

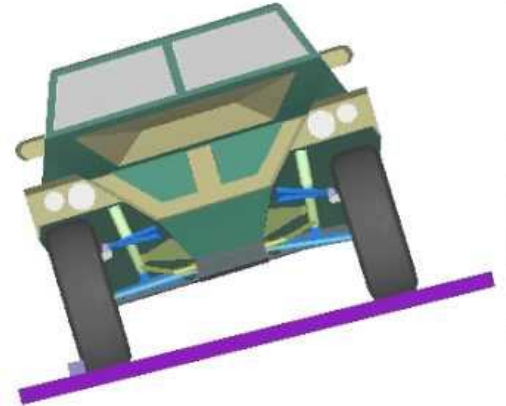
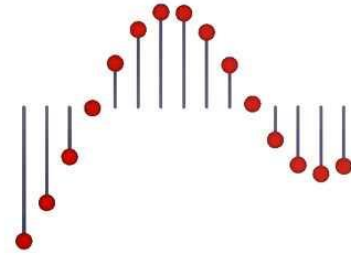


Dynamic simulation

Project name: Euler, roboTester (Sep2006-Dec2013)

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- <http://www.euler.ru> simulate vehicle dynamics
<https://www.youtube.com/user/EulerCAE/videos>
- improve simulation core
- interface to Simulink WorkShop
- Node remuneration for Sparse Matrix representation
- Craig-Bampton
(https://en.wikipedia.org/wiki/Dynamic_substructuring)
- Export data from CAD (NX, SolidWorks, Autodesk Inventor)
- DSL for list comprehension
- Tools for create custom Application
- Tool for auto testing
- CI-pipeline via bat-files
- Fork boost::tuple, QDialog
- Tech.stack: C++11, Boost, Qt, VStudio/QtCreator

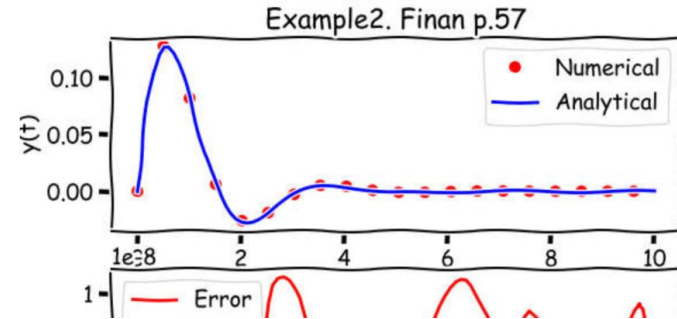


FEA

- Finite Element Analysis of an Inverse Problem Static/Dynamics
- Direct problem: find x from $[K]\{x\}=\{P\}$
- Inverse problem: having $[K]$ and x_i , find $\{x\}$ and P_i
- same for dynamics problem
- Transient analysis
- Steady state response
- Sensitivity analysis

Control theory

- Calculate transfer function by Adjacency Matrix
- Transient analysis for input with Dirac delta function
- <https://github.com/stdapproach/ppt/blob/main/solveLinearOdeDeltaFunction.pdf>



Due to $[A]$ is lower-triangle matrix and $\{d\} = \{0, 0, \dots, b\}$ the main result is following:

$$\begin{cases} L_n(\{a\}, y) = b\delta(t) \\ IC_0 \end{cases} \equiv \begin{cases} L_n(\{a\}, y) = \mathbf{0} \\ IC_0 + [A]^{-1}\{d\} \end{cases} \equiv \begin{cases} L_n(\{a\}, y) = 0 \\ IC_0 + \{0, 0, \dots, b/a_0\}^T \end{cases}$$

Courses

- Coursera:
 - Mathematics for Engineers Specialization
 - Matrix Algebra for Engineers
 - Vector Calculus for Engineers
 - (in progress) Differential Equations for Engineers
 - Data Visualization using Plotly, Regular Expressions in Python
- Youtube courses:
 - Lockdown Math
<https://www.youtube.com/playlist?list=PLZH00b0WTODP5CvelJJ1bNDougrAhVPev>
 - [RU] Магистерский курс C++ (МФТИ, 2022-2023)
[https://www.youtube.com/results?search_query=Магистерский+курс+C%2B%2B+\(МФТИ%2C+2022-2023\)](https://www.youtube.com/results?search_query=Магистерский+курс+C%2B%2B+(МФТИ%2C+2022-2023))
 - [RU] Цикл лекций о великих математиках
https://www.youtube.com/playlist?list=PLmu_y3-DV2_k-Tnu_L-uZ8FMbTWGce-ED
 - [RU] матан|Борис Трушин
<https://www.youtube.com/playlist?list=PL3BJnp-dNqazNc11qgguxNcJwCMqwK5Yv>
- Oct22, C++ online test <https://www.testdome.com/certificates/0705377dcd4b49df99c0e2a117991c0d>
- 2022 AUTOSAR Classic MATLAB, Multithreading fundamentals in C++, C++17 Fundamentals Part I, Adaptive AUTOSAR Basics, C++ Code Refactoring for C++, Haskell fundamentals
- 2020 Mechanics/Part 1,2
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Which science topics I'm into

- CLI for editing/simulation/analysis of model
- State Equation (Observability/Controllability)
- Transient analysis (Free response, Impulse response, nonZero IC
- Transfer function
- Parallel Sparse direct Solver
- Inverse problem: find parameter value delivering expected characteristics
- Sensitivity analysis
- Optimization problem
- Model reduction
- Krylov subspace projection
- Structure preserving reduced order
- ? Craig-Bampton analog ?
- PhD?

Contact

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github.com/stdapproach/ppt

