

Denis Pleshkov

Senior C++ Developer

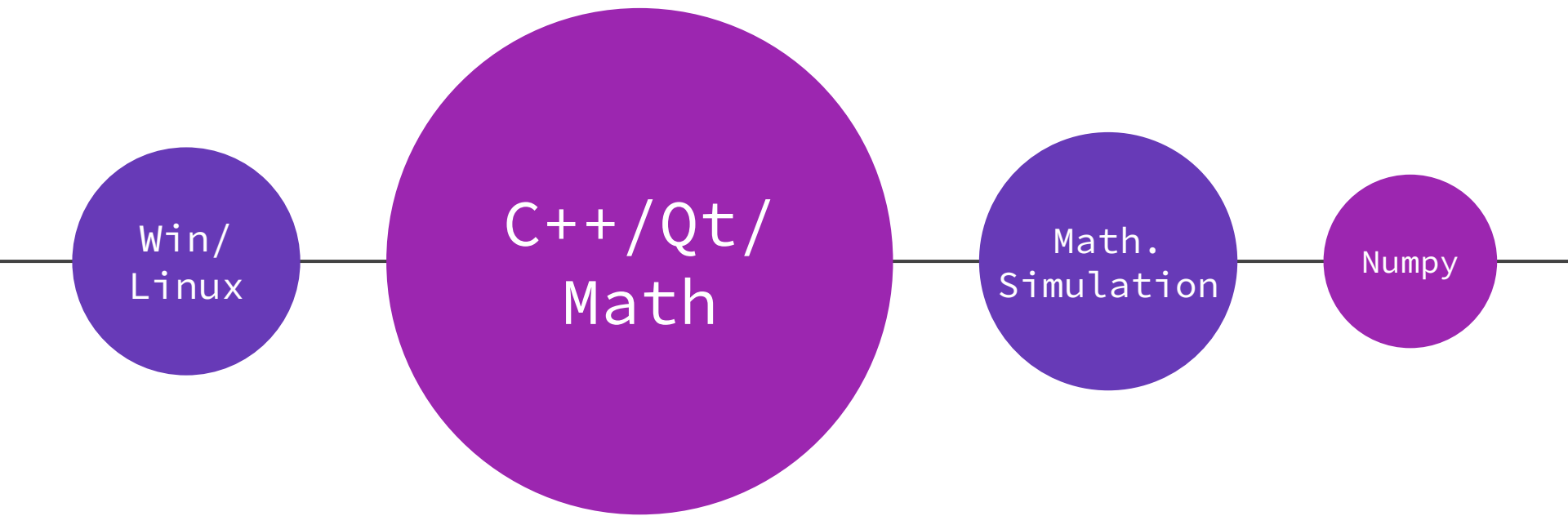
About me

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

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

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

Knowledge



Project name: NDA (Feb23-now)

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- Software for dentist
- 3D computational geometry, quaternions, vector algebra
- in contact with QA and stakeholders: implement new features, bug fixing
- calculate 'optimal' plane and provide rich GUI to edit/show this plane
- CleanUpDlg, py-framework downloading/batch testing
- parsing log files
- unit testing, 3d rotation via keyboard
- Tech. stack: C++17/Qt/OpenGL, cmake, VisualStudio2020/ReSharper, MeshLab



AD for OEM from Munich

Project name: NDA (Aug21-Feb23)

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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 flow with digital signature
- Plugin for [TeamCenter](#)
- Tech.stack: Java, JNI, C++, Qt, QtCreator/Eclipse
- 3rd-party Crypto-Lib

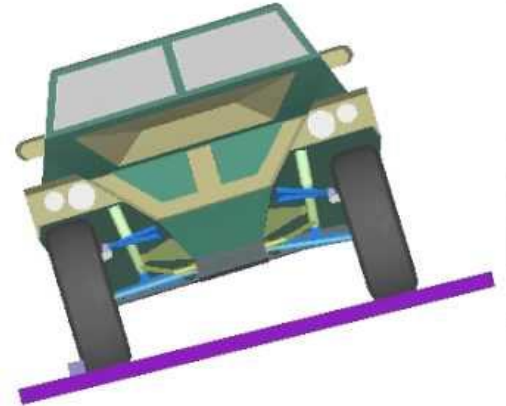
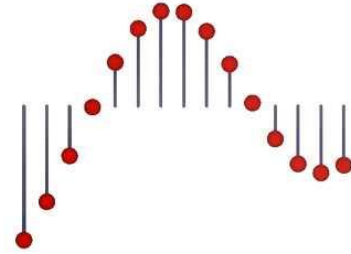


Dynamic simulation

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, VS/QtCreator



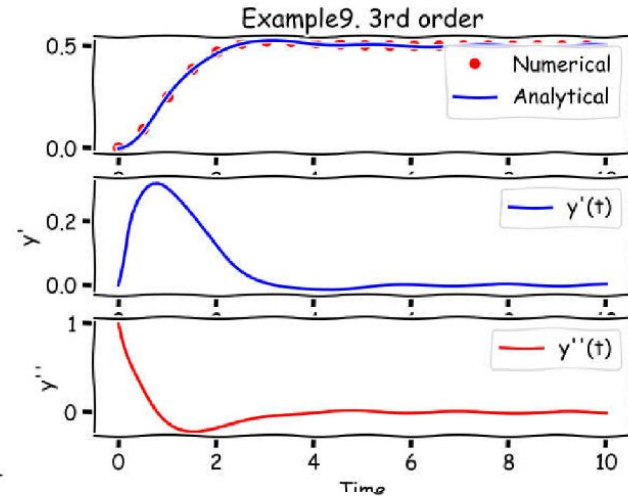
FEA

- 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

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

Control theory

- Calculate transfer function by Adjacency Matrix
- [Transient analysis for input with Dirac delta function](#)



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

Courses & Certificates

- Math
 - Calculus ([1Functions](#), [2Differentiation](#), [3Integration](#), [4Application](#))
 - Mathematics for Engineers Spec.: [Matrix Algebra for Engineers](#), [Vector Calculus for Engineers](#), [Differential Equations for Engineers](#)
 - [Linear Algebra from Elementary to Advanced Spec.](#): [Linear Systems and Matrix Equations](#); [Matrix Algebra Determinants & Eigenvectors](#); [Linear Algebra: Orthogonality and Diagonalization](#)
 - [Mathematics for Machine Learning Spec.](#) ([Linear Algebra](#), [Multivariate Calculus](#), [PCA](#))
 - Linear Algebra for Data Science Using Python Spec.: [Introduction to Linear Algebra and Python](#), [Fundamental Linear Algebra Concepts with Python](#)
 - [Math for AI beginner part 1 Linear Algebra](#)
 - Statistic:
- DSP: [Digital Signal Processing 1: Basic Concepts and Algorithms](#)
- ML
 - Pandas: [Mastering Data Analysis with Pandas](#)
 - Regression: [Linear Regression with NumPy and Python](#),
 - JuliaLang: [Julia Scientific Programming](#), [Julia for Beginners in Data Science](#), [Decision Tree and Random Forest Classification](#), [Linear Regression and Multiple Linear Regression](#)
- Rocket Science: [Rigid Body Dynamics](#), [Mastering Statics](#)
- Computer Vision
 - [Computer Vision Basics](#)
 - First Principles of Computer Vision Specialization: (in progress)Camera and Imaging
 - [Object Localization with TensorFlow](#), [Deep Learning with PyTorch](#)
- CFD:
- Vibration:
- Matlab: [Matlab Onramp](#),
- Wolfram:
- R: [Introduction to R: Basic R syntax](#), [Getting Started with R](#)
- Kotlin/Java: [Kotlin for Java Developers](#), [Create an Android App with Kotlin](#), [Kotlin For Beginners: Data Types and Conditional Expressions](#), [Create Your First Multithreaded Application in Java](#)
- Rust: [Rust for Beginners: Building Target Proximity Game](#), [Rust Secret Cipher CLI](#)
- Python:
- SQL: [Create a Python Application using MySQL](#)
- Docker: [Introduction to Docker : The Basics](#), [Docker for absolute beginners](#), [Containerization Using Docker](#), [Docker Essentials & Building a Containerized Web Application](#), [Introduction to Docker: Build Your Own Portfolio Site](#)
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Courses & Certificates-2

- C++: Writing Secure Code in C++ Specialization ([Introduction to C++](#), [C++ Interacting with the World and Error Handling](#))
- Youtube courses
 - 3Blue1Brown: [Lockdown Math](#), [Essence of linear algebra](#), [Essence of calculus](#), [Differential equations](#)
 - Math for Game Devs ([part1](#))
 - [RU] [Магистерский курс C++ \(МФТИ, 2022-2023\)](#), [Цикл лекций о великих математиках](#), [матан|Борис Трушин](#), [Линейные системы автоматического управления](#)
- Oct22, [C++ online test](#)
- 2022 AUTOSAR Classic MATLAB, Multithreading fundamentals in C++, C++17 Fundamentals Part I, Adaptive AUTOSAR Basics, C++ Code Refactoring for C++, Haskell fundamentals

Which 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

Contact

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github.com/stdapproach/ppt

