

# LANCE A. ENDRES, PH.D.

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## Summary

An experienced research and development engineer in the area of computational dynamics and mechanics. Creative thinker with excellent presentation and communication skills. Experience with project management, team leading, and working internationally on team based projects.

## Areas of Expertise

Computational Mechanics • Computational Dynamics • Numerical Integration • Drilling Mechanics and Dynamics • Data Analysis and Interpretation • Structural Analysis • Software Architecture • Programming • FEA • Research

## Experience

**APS TECHNOLOGY** - Houston, TX

1/2014 - Current

### *Principal Engineer*

Areas of work included drilling dynamics, drilling optimization, and data analysis.

- Conducted an in-depth review of a proprietary drilling dynamics tool that uses magnetorheological fluid to adjust the damping properties of the tool. Review included sensor capabilities, calculations performed by the firmware, data produced, control algorithms, dynamic behavior, and operational usage. The conclusions were documented and recommendations made on how to proceed with further testing and development of the device.
- Developed an FEA based software that calculates deflections, stresses, natural frequencies, and mode shapes of a drill string. The software is used to assess the bending capabilities and stress limits of tools and drill strings for use in directional drilling applications. It is also used to ensure natural frequencies are not excited (avoid resonance) and to assess changes in mode shapes that occur from different tool designs.
- Developed specialized data processing techniques and algorithms used to automate cleaning and processing of drilling data. The software removes corrupted data points and separates the data into drilling versus non-drilling (standby) time. Reduced the process from an hour to a minute.
- Developed generalized plotting software designed to work with data from any downhole tool. Software is immune to changes in firmware, easily adaptable to new tools, has error handling for corrupted data, and automatic conversion of units. The industry lacks standards for data handling, so similar data is often stored differently, even within a company. Before I solved this issue, three others at APS had tried and failed to find a maintainable solution. Updates and new product introduction eventually rendered all previous attempts obsolete.

**BAKER HUGHES** - Houston, TX

1/2006 - 11/2013

### *Researcher in Drilling Mechanics and Dynamics*

Conducted research in the areas of drilling mechanics and dynamics. Work included developing theoretical understandings of drilling behavior, designing laboratory experiments, and developing computer models to predict drilling behavior.

- Developed an advanced, proprietary computational dynamics application used to predict and analyze the dynamic behavior of drill bits. Was responsible for implementation and accuracy of
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- physics, software design and architecture, algorithms, project schedule, deliverables, and budget.
- Developed a laboratory analysis technique to improve understanding of lateral bit dynamics. The technique is a physics based approach that replaced the previous assumption based method. The new method let engineers better interpret the results of laboratory tests.
  - Improved theoretical understanding of lateral drill bit vibrations. Used this understanding to create new techniques for designing drill bits. These techniques let engineers design bits directly rather than requiring hundreds of computer simulations to find a solution.
  - Designed and oversaw running of experiments in laboratory setting and on a full scale drill rig.
  - Analyzed and interpreted computer, laboratory, and drill rig data.
  - Developed software to post process a variety of disjointed laboratory and computer data types in a standardized, uniform way.
  - Lead a software development team based in Russia.
  - Trained new employees and directed the work of interns.
  - Served as a member of a cross-divisional numerical modeling and simulation committee.

## Education

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| UNIVERSITY OF CALIFORNIA, SAN DIEGO    | 2007 |
| <i>Ph.D. in Structural Engineering</i> |      |
| UNIVERSITY OF CALIFORNIA, SAN DIEGO    | 2004 |
| <i>M.S. in Structural Engineering</i>  |      |
| LAWRENCE TECHNOLOGICAL UNIVERSITY      | 1999 |
| <i>B.S. in Civil Engineering</i>       |      |

## Publications

- [1] L. Endres. Signal segmentation algorithm of Radhakrishnan, et al. ported to C and C#. *Code Project*, online article.
  - [2] L. Endres and P. Krysl. Refinement of finite element approximations on tetrahedral meshes using charms. In *Seventh U.S. National Congress on Computational Mechanics*, Albuquerque, NM, July 2003.
  - [3] L. Endres and P. Krysl. Octasection-based refinement of finite element approximations on tetrahedral meshes that guarantees shape quality. *Int J Numer Meth Eng*, 59(1), 2004.
  - [4] L. Endres and P. Krysl. Second-order explicit integrator via composition for coupled rotating rigid bodies applied to roller cone drill bits. *Commun Numer Meth Eng*, 24(12):1923–1940, 2008.
  - [5] Lanson Adam Endres. *Computation Modeling of Drill Bits: A New Method for Reproducing Bottom Hole Geometry and a Second-Order Explicit Integrator via Composition for Coupled Rotating Rigid Bodies*. PhD thesis, University of California, San Diego, La Jolla, CA, December 2007.
  - [6] P. Krysl and L. Endres. Explicit Newmark/Verlet algorithm for time integration of the rotational dynamics of rigid bodies. *Int J Numer Meth Eng*, 62(15):2154–2177, 2005.
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- [7] T. Schwefe, L. W. Ledgerwood III, J. R. Jain, D. M. Fuselier, L. Endres, and H. Oueslati. Development and testing of stick/slip-resistant PDC bits. In *SPE Drilling Conference and Exhibition*, Fort Worth, TX, March 2014.

### Patents

- [1] Lance A. Endres, Gregory C. Prevost, and Tyler R. Reynolds. *Drill bit with distributed force profile*. U.S. Patent 20130008724, filed June 14, 2012.
- [2] Lance A. Endres, Tyler R. Reynolds, and Gregory C. Prevost. *METHODS OF DESIGNING EARTH-BORING TOOLS USING A PLURALITY OF WEAR STATE VALUES AND RELATED METHODS OF FORMING EARTH-BORING TOOLS*. U.S. Patent 201300835902, filed August 5, 2011.
- [3] Andreas Hohl, Mathias Tergeist, Hatem Oueslati, Christian Herbig, Jayesh J. Jain, Hanno Reckmann, and Lance A. Endres. *Method to mitigate bit induced vibrations by intentionally modifying mode shapes of drill strings by mass or stiffness changes*. U.S. Patent 20150122547, filed November 1, 2013.
- [4] Gregory C. Prevost, Lance A. Endres, and Tyler R. Reynolds. *METHODS OF DESIGNING EARTH-BORING TOOLS USING A PLURALITY OF DEPTH OF CUT VALUES AND RELATED METHODS OF FORMING EARTH-BORING TOOLS*. U.S. Patent 20130035903, filed August 5, 2011.

### Other Skills

- Engineering and Research: Design of laboratory experiments, stability analysis, signal processing, algorithm design, CFD (basic), plasticity, structural engineering, 3D modeling, additive manufacturing, teaching, and technical writing.
  - Programming: C, C++, C#, .NET Framework, Visual Basic, Fortran, AutoLISP, threading (POSIX and .NET), XML, XPath, XSLT, HTML, XHTML, CSS, Windows Installer XML (WiX), UML, XML Schema Definitions (XSD), PHP, JavaScript, code profiling and optimization, and software architecture.
  - Other software: Visual Studio, AutoCAD, Matlab, Tortoise/HG/SVN/CVS, GitHub, SAP 2000, RISA-3D, Lisa FEA, iSIGHT design optimization software, LaTeX, NX, Fusion 360, and Ansys.
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