**Physics Work Flow** PhL 3.26.05

Red shows (1) name of book being started (or resumed) at that time; (2) a side topic that I worked on, usually something in the math world.

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**Sept-Oct 2006** ~ 2 yr **Thomson** Maestro/APEX gig ends, review **Campbell**

**Nov-Dec 2006** Start **Watson**, have roof adventure

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**Feb-Mar 2007** **Watson** Cell Biology Ch 7-9 (and Rome readings)

**Apr-July 2007** **Watson** 9-24 and finish it, a peek at Reif

**Aug-Sept 2007** Start MS with **Weiner** book then start **McAlpine** MS book

**Oct-Dec 2007** Continue **McAlpine** but stop before "main drug" Ch18 , start **Levitt** on NMR

Summary of 2007 by numbered month

1 Thomson VMIX short gig revisit
2-3 **Watson** Cell Biology Ch 7-9 (and Rome readings)
4-7 Watson 9-24 and **finish Watson**, a peek at Reif
8-9 start MS with **Weiner** book then start **McAlpine** MS book
10-12 continue McAlpine but stop before "main drug" Ch18 , **start Levitt** on NMR

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**Jan 2008** all Levitt

6 finish **Levitt** monster appendix on **Phase Cycling**
7-8 genuine research days on **NMR** stuff
9 **two attic physics boxes** down to basement
14 worked on my own **density matrix** notes
15 review **spin** stuff
16 start **meta** review of entire Levitt book
17 meta reviewing Chaps 8 and 9
18-19 meta review Chap 10
20 meta review Chaps 11 & 12
21 meta review Chaps 13
22 review **COSY** stuff
23 wrote up all **support math** for Levitt
24 finish separate doc on **COSY**
25 finish COSY, start **INADEQUATE**
26 Phil's **Z-matrix Method** for doing spin
28 finish "**phil theory of coherence flow**.doc"
29 update **meta** review

30 upgrade to Office 2003, Visio 2003, **Onenote** screen clips begin
31 Levitt on **magnetization transfer** and **INEPT**

**Feb 2008** pause Levitt at Ch 13, tax time, then resume McAlpine MS

1 reading in **Levitt** Chap 13 on AX experiments
2 derived secular form of **dipole-dipole coupling** Hamiltonian
3 finish **Levitt** Chapter 13, pause Levitt with more chapters to go
5 stop physics for a while, RMC amended returns & taxes
11 rare AFIB attack, another about a month later
13 resume **McAlpine** on Multiple Sclerosis, so physics now on hold

**Mar 2008** finish McAlpine, read all of **Minegar** then some papers

1-30 finish McAlpine, read all of Minegar's 2007 MS book

**Apr 2008** Finish Levitt

1-15 resume and finish Levitt

**May 2008** Goldstein Ch 1-3

5 start reading **Goldstein** **Mechanics**
6 finish Goldstein Chap 1
12 after gap, start Goldstein **Variation** Chapter 2
13 have started my own MS document, but did not get far.
14 more Goldstein on variation
15 finish Goldstein Chap 2; doing Spanish at this time as well, and Merin work
30 reading Goldstein Chap 3 on **central forces**, after a long gap
31 Goldstein on Kepler's Laws

**June 2008** Goldstein Ch 3-4

4 finish **Goldstein** Chap 3 on Central Forces
9 Goldstein on **Rotational Kinematics**, after a gap
10 finish Chap 4 on Rotational Kinematics
12 Chew Torrey visit, lots of physics talk, then Cape Cod age 60

**July 2008** Goldstein Ch 4-9

9 a short Thomson gig
14 reviewed first 3 chapters of Goldstein, start meta review of them
15-16 review **Goldstein** Chap 4, meta notes through this chapter now
17 start Goldstein Chap 5 on **rotation** stuff, the ellipsoid
18 finish Chap 5
19 finish meta notes on Chap 5

20 general all-books review of **rigid body motion**, Lagrange points
21 start Goldstein **Relativity** chapter 6
23 finish relativity, do meta there, start **Hamiltonian** chapter 7
24 did meta notes on Hamiltonian chapter, start **Canonical Transform** chapter 8
27 finish Canonical Transforms chapter and did its meta review
28 start Chapter 9, doing **Action-Angle variables** (Charlotte/Gina move in)
30 action angle on Kepler problems
31 finish Chapter 9

**August 2008** finish Goldstein (Ch 9-11), start Mandl then BDI Ch 1-4

1 review of **Surface Geometry** stuff, re Goldstein wavefronts
2 more on Surface Geometry
3 Goldstein on **The Big Parallel** optics/eikonal to quantum/classical mechanics
4 meta review of Goldstein Chap 9 on **Hamilton-Jacobi** theory
5 fully done with Chap 9
6 start **Goldstein** Chap 10 on **small oscillations**, did the Pendulum
7 monster session on **Jacobi elliptic integrals**, wrote it up, all math
8 did my own plane **pendulum** write up, did an actual experiment with one
9 **Hamilton-Jacobi** on plane pendulum
10 did quantum solution to plane pendulum; started math/physics histomap
11 resumed Goldstein Chap 10 oscillations, lots of Maple work
13-14 wrote a huge new Maple User Guide
15-16 oscillations of linear molecule
17 finish Goldstein Chapter 10 including meta
18 start Chap 11 on **continuous systems**
19 finish Chap 11 and the entire Goldstein book
20 finished meta review of entire Goldstein, all done!
21 start **Mandl** on Quantum Field Theory, read first 6 chapters in two days
22 start **Bjorken Drell** RQM first 9 pages, need this stuff for Mandl
23 BD covariance proof bog down, all Dirac electron theory
24 finish Chap 2, start BD Chap 3
26 battle BD projection operators
27 finish BD Chap 3 on Dirac free particle solutions
28 BD Chap 4 on FW transformation
29 Confused about angular momentum while reading BD, off to **M&M Chap 5**
30 **M&M** readings on tensor stuff

**Sept 2008** M&M curvilinear, BDI 4-7, Lorentz Group digression

1 M&M covariance proof of $V_{a,b}$ object
2 doing well in **M&M Chap 5** on **curvilinear coordinates**
3-4 relearning meaning of divergence and curl etc in general coordinates
5 did Curl start to finish
6-10 continuing on curvilinear coordinates work
12 second Thomson gig

15 **back to BD** wave packets and Klein Paradox, but messed up on FW
16 read BD on the H atom, just a summary
17 BD Chap 5 on **Hole Theory**
18 meta notes on Chap 5, start into Chap 6 on **Propagators**
19-20 more on Chap 6 propagators
21 getting ready for **Coulomb Scattering**, review Mott and Goldstein
22 did all details of Mott scattering in Ch 7
23-24 back and fill on BD stuff
25 studied Moore's notes on the Lorentz Group
27 did work on the $\mathbf{R}\mathbf{V}\mathbf{R}^{-1} = \mathbf{R}^{-1}\mathbf{V}$ problem
28-29 continue on the above problem which I called **QM Algebra**
30 more of the same, confusion boosts being unitary or not

**Oct 2008** resume BDI Ch 7-8

1-2 more cleanup on the QM algebra problem
3-4 wrote my own **Lorentz Group** document based on Moore notes
5-8 learning about **representations of the Lorentz Group** with spinors
9 **dovetail back into BD** in Chapter 7, re u(p,s) LG computation
10 finished my u(p,s) spinor calculation
11 doing BD positron scattering, endless new questions arise
12 BD on p-e scattering and the Moller potential
13 BD section 7.5 on higher order corrections
15 BD on **Compton** scattering and Klein Nishina, then Buffy Torrey trip
21 BD and **Thomson** scattering
23 meta notes on Compton
24 BD on **Moller** Scattering
25 BD on **Bhabha** Scattering
26 finished BD Chapter 7, a Big Milestone for me
27 started into BD **Chap 8** on higher order graphs
28 doing BD **vacuum polarization** n ad 27 MHz Uehling
30 at page 169 doing **vertex correction**, ran into a large Feynman integral

**Nov 2008** BDI Ch 8-10, ran into pion phase shifts, switch to Schiff Ch 5

1-2 **anomalous magnetic moment** in vertex correction
3 finished BD chapter 8, doing meta on that chapter
4 start BD **Klein-Gordon** chapter 9, all new to me
5-7 applying FW to the KG problem, then Cape Cod trip
17 finished BD Chap 9 on Klein-Gordon theory, only 1 chapter left
19 started BD **chapter 10 on pion-nucleon** scattering
21 doing **isospin** in π-N scattering
24 mention of **"phase shifts"** in π-N sends me off to Schiff collision theory
25 reading **Schiff** Chap 5 to page 117
26 learning about the $\delta_\ell$ phase shifts
27 wrote a note on "**diagonalization**" and angular momentum and QM

28-29 read about **complex potentials** in Schiff Chap 5, optical theorems etc

**Dec 2008** Schiff Ch 1-5, Bateman CHGF, Messiah Ch 10, 95% Saxon, Schiff Ch 6-7

1 paused in Chap 5, backed up and read **Schiff Chaps 1+2**
2 read Schiff **Chap 3**, start Chap 4, bog down on HO
3-4 read Schiff **Chap 4** on the H atom treatment
5 studied **parabolic coordinates** for first time, finish Schiff **Chap 4**
5 wrote Schiff **meta** notes for Chaps 1-4 + some of
6 wrote Schiff **meta** notes Chap 5 up to Coulomb stuff
7 digression on **Laplace's Method** re the **Messiah** $\mathbf{W}_{1,2}$ Coulomb functions
8 learned the **Messiah appendix on** $\mathbf{W}_1$ **and** $\mathbf{W}_2$ via contours
9 reading Schiff Chap 5 on **Coulomb scattering**
11 derived Schiff 143 A, took all day
12 **digression on ODE** stuff like Frobenius method, re Coulomb ODE
13-14 read **Bateman on the CHG functions**, made connection to $W_{1,2}$
15-16 learned connection to **A&S section on Coulomb Wave Functions**
17 resume reading **Schiff Coulomb** scattering section in Chap 5
18 tried and failed to roll my own solution of Coulomb in sphericals
19 separate study of **Coulomb scattering in parabolics** and why it is simple there
21 finish **Schiff meta** notes on Chap 5 including the Coulomb stuff
22 digress and reread the first **entire half of Saxon** from Hillis days
23 **finished Saxon**, skipping a few sections which I filled in much later
24 read **Messiah Chap 10 on scattering theory**
25 start into **Schiff Chap 6 on Matrix Mechanics**, with some old notes too
26 finish Schiff Chap 6
27 start into **Schiff Chap 7 on Symmetry**
28 start the "dynamical symmetry" part of Schiff Chap 7
29 learned about **H atom's SO(4) s**ymmetry and the LRL vector, first time ever
30 learned about **SU(3) and the HO**
31 finish Schiff Meta notes for Chapters 6 and 7.

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**Jan 2009** SSPT: Schiff Ch 8, Saxon, Messiah, fin Stakgold Ch 2, Messiah Kato

1 **Start into Schiff Chap 8, SSPT**
3-5 Rolled my own Stationary State Perturbation Theory doc; Theorems A,B,C
6 Read **Saxon's** version of SSPT
8 Start into **Messiah** on SSPT, met $Q_0$ and $Q_{0a}$
10-19 resume dormant **Stakgold Chap 2** on operators
11 make Venn diagram of all the Stakgold spaces
14 start Stakgold Chap 2 meta review
16 getting into Stakgold ∞ dim Hilbert Space theorems
18 finish Stakgold Chapter 2, took 7 full days
20-27 Started the **Messiah Kato** resolvent section on SSPT
28 Messiah meta notes on non-Kato stuff

29- Messiah **Kato** meta notes

**Feb 2009** SSPT: finish Messiah Kato, angular momentum digress, Schiff Ch 8 WKB

-8 **Kato** meta notes
10 Messiah SSPT **examples**
11 Digression on **spherical harmonics**
12 **LS and jj coupling** Messiah examples
13 Wrote doc on "**adding**" angular momenta
14-16 Doc on **05/07/17**, j addition, etc
26 resume back in Schiff Chap 8 after SSPT
27 read Schiff **meta** notes on Chaps 1-7
28- read Schiff on the **WKB approximation**

**Mar 2009** Schiff Ch 8 WKB; TDPT: Schiff Ch 8, Saxon, own, start Stakgold Ch 3

1-2 reading Schiff Ch 8 on **WKB** (cold day #1)
3-18 ongoing flu, could still work though
3-4 read **Schiff on Time Dependent Perturbation Theory**
5 finish Schiff Chap 8
6 write Schiff meta notes on TDPT
7 started **Saxon on TDPT**
9-10 finish Saxon TDPT, started to roll my own TDPT
11 finished **roll my own TDPT doc**
13-21 **Stakgold**: review Chap 2 meta, **start and finish Chap 3** on integral equations
22-29 do **Fredholm Theory** from various sources; tax season
30 start Stakgold Chap 1 on Green's & Distributions & ODEs

**Apr 2009** Stakgold Chap 1, review Ch 2&3, then do Chap 4

1-17 do and finish **Stakgold Chap 1**
19-22 review meta notes for Stak Ch 2 and Ch 3, wrote Ch 3 meta-meta
23 start into **Stakgold Chap 4** Spectrum of Diff Operators
24-30 continue Stakgold Chap 4

**May 2009** finish Stakgold vol I and just start vol II

1-2 wrote Chap 4 meta then meta-meta notes, all done with Stakgold Volume I
6-16 Cod/Lee trip, then Susan/SPL/Balls/M&A Torrey trip
29-31 start **Stak Vol II,** chap 5, to p 14

**June 2009** **Stakgold Chapter 5**

1-27 Stakgold to p 69, chap 5

**July 2009** Stakgold finish Chap 5, start into Chap 6 (potential theory)

4-7 Stak chap 5 meta started
8 wrote "**parts and greens.doc**" after "attempts to prove p 40 greens" doc
9 update "**integral theorems**.doc" with theorems and derivations
10-14 finish Stakgold Chap 5 raw, meta, *and* meta meta notes.
15 start **Stakgold Chap 6**
16-31 continue Stak Chap 6 to page 130

**Aug 2009** Stakgold Chap 6, hold at conformal mapping and read 3 Chaps Ahlfors.

1-9 continue Stak Chap 6 to p 149
10 did first-ever proofs of **Divergence and Stokes theorems** in $R_n$
11-12 reach conformal map part of Chap 6 p 164, and push the stack to **Ahlfors**
12-20 read first 3 chapters (100 dense pages) of **Ahlfors** "Complex Analysis".
21-31 NH/Cod trip

**Sept 2009** Ahlfors meta notes, then back to Stakgold Chapter 6

1-6 **Ahlfors** meta review; note Cantor and Axiom of Choice and Continuum Hypothesis
7-9 wrote "**Projective and Fractional Linear Transformations**.doc"
10-12 finish Ahlfors meta review doc
13 start Stak Chap 6 meta notes.
14-23 continue Stak Chap 6 meta to p 164 (conformal mapping Green's Function)
24-28 Exercise 6.35: Green's function for a 2D strip by infinite set of images (3 docs)
28 Wrote " **theory of infinite products**.doc" related to the image charge form.
29 finish Exercise 6.35 successfully, do other problems in this section of Chap 6.

**Oct 2009** Stakgold Chapter 6: finish chapter, meta and meta-meta docs, do exercises

2-5 Torrey trip: Merin & ladies & kids, Blairs, Romines
7 wrote "green's and change of coordinates"
8-10 resume Stak Chap 6 "**physical applications**"
11 wrote **Legendre My Problem** docs (series that don't exist)
12- 16 the **2D finite wire problem** ("extruded strip") -- think $8^{th}$ order curves
16-18 wrote "**ellipses.doc**" related to 2D wire equipotential surfaces being ellipses
20 wrote " **divergence J and V.doc**" comparing electric current to mass current etc
21 the above explains the **fluid flow** application of the Laplace equation
22 start end-of-chapter **exercises**, end of Stak Chap 6, p 191
23 did Exercise 6.47 related to 2D wire charge (error found in Schaum; Russian books)
24-25 start Chap 6 meta-meta review
26 resume Chap 6 meta review
28 finish both meta and meta-meta reviews of Chap 6.
29-31 Exercises 6.48, 6.50, start 6.51
31 am led back to the painful "**half sphere problem**".

**Nov 2009** Parse Kelvin, digress into curvilinears in general + ellipsoidals + oblate spheroidals

1 realize **half-sphere paradox** due to non-existent series (wrong!)
2 read Jackson on the **method of inversion**, Jim suggestion
3 wrote "**conformal mapping** applied to potential theory.doc"
5 inversion relates spherical cap problem and the disk problem
6 realize that I need the disk on-axis Green's function to do this
7 did **oblate spheroidal** coordinates using MF notation
8 learned about **Kelvin's p-parameter's** two meanings
9 parsing **Kelvin's paper**, eventually he agrees with MF
11 no grav force on mass inside thick **similar ellipsoidal shell**
12 **ellipsoidal coordinates** MF style
13-14 Maple finally **plots** the ellipsoidal coordinate surfaces
15 re-parse Kelvin, get happy (potential and charge of charged ellipsoid)
16 why do confocal ellipse and hyperbola **intersect at right angles**?
17-26 write "**tensors and curvilinear coordinates.doc**", the final solution
27 pop stack, write "3 potential of charged **ellipsoid**.doc" and META for same
28 pop stack, write "2 **Oblate** Spheroidal Coordinates and the Metal Disk Problem.doc"
29 wrote "5 Summary of Facts about **Metal Objects**.doc"
30 ran into the mystery of the 3D wire (**needle**), Crodt and Jackson and others.

**Dec 2009** Smythe and Morse & Feshbach readings on advanced electrostatics

1 updated this doc and annual timelines
3 start **Smythe** **hole in plate** problems
4 review of **SL theory** causing quantization of separation constants
5 **wrote** " Smythe hole in plate problems.doc"
7-14 **Cod** trip, prep do and recover.
15-19 read **MF 50 page chunk on ODE's**, pondering SL theory and quantization
20 wrote " an **ODE essay on MF Section 5.2**.doc", I give this a high rating (SCK)
21 did a bit on the M&F **T functions**; words zonal, sectorial, tesseral
22 **completeness** of SL problem solutions, aid from Courant and Hilbert
23 pondered **orange-slice** situation where m quantization is non integral
25 learned about **Lame** solutions
26 wrote " **questions about Legendre** functions.doc" and a meta version
28 got a new **Maxima** and plotted some Legendre functions
29 walk-through of **Smythe Chapter 5**, the Smythian Form Method
31 studied you see products of radicals in certain ODE solutions, then wrote
" product form for Lame and Legendre solutions.doc" (ellipoidals)

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**Jan 2010** Smythe readings, try his method on Oblate Green's

2-3 start **Smythe** **Green's function of cone**, learning the **Smythian Form Method**
4 apply this method to the **sphere**.
5 **prep for oblates** in order to follow Smythe into this area
6-7 read Smythe's solution of the **Neumann problem for the oblate spheroid**

8 did my own Smythe Form solution for **Dirichlet problem of oblate spheroid**
9 did **Green's Function for oblate spheroid**, Smythe **Problem 85**; **pillbox** stuff
10 wrote " **gamma function** page.doc"; PDF to DJVU converter found
11 wrote " the **Smythe method for Green's Functions, cone examples.doc**" and a meta version, summarizing all work done above in January.
13 wrote " **Jackson method of inversion META**.doc" (still thinking bowl)
15-17 **pondering bowl problem as inversion** of on-axis disk Green's function
18 wrote " cos(nx) over sqrt(a-bcosx).doc" about doing a particular **integral** obtained a PDF of 2007 **GR7** table of integrals, learned history of same
19 pondered **why charged disk problem is so difficult** (Green Kelvin footsteps)
22 wrote " **Power series** and f(x) constant in a finite region.doc" math misc. because the charged disk was fighting me in spherical coordinates
25 wrote " **Why spherical atoms don't work** for origin on metal.doc" (disk)
26 more **Green's Function for an oblate spheroid**; started **Legendre properties** database wrote " properties of Legendre functions.doc"

At this point, I had the oblate Green's, so I could take the on-axis disk limit. But it was still a messy double sum, so would not be useful in my inversion to get the charged bowl.

27 started **Green's for oblate hyperboloid**, looking for simple Smythe **Problem 35** result
28-31 many difficulties encountered trying the Green's Bloid, it was a Maze of problems.

**Feb 2010** all spent doing Oblate Bloid and Legendre stuff

1-2 tried doing the **Oblate Bloid** with the non-cone method, it failed.
3 worked on **Oblate Bloid** using the **cone method**, potential comes out complex
4-6 constructed **real atoms p and q** to replace P and Q
7-8 wrote "**those orbital things.**doc", a distraction, for SKC ( a very long doc!)
9-10 wrote " **oblate bloid** with p and q attempt 2.doc" which is now obsoleted
11-12 wrote "study of (1-z)^a and related.doc" discussing cut and sheet confusions.
14 tried again on **Oblate Bloid** with the new real p and q functions
15-17 studied the cut structure of various kinds of **Legendre functions**
19 wrote "convergence for Bateman forms.doc" (plots for Legendre convergence)
21 found an error with my q function
23 learned how to see **Maple's internal code** for Legendre evaluation
24-25 **Legendre** function details
26-28 found out why my old P Q **Oblate Bloid** solution was wrong (besides being complex)

**Mar 2010** cylindricals, ring and disk, Legendre properties

1-6 break time: Ball's oven, Dave's printer, taxes, SQLite, exec log, Lee APL
7-8 review and wrap on the **Oblate Bloid**

I had hoped this would give a simple answer for point charge in iris hole as per Smythe problem 35. Both simple answer and the bloid double sum answer are correct, but I cannot relate them.

9 pondered the electrostatics of **rings**, leads to intractable **integral equations**
10-13 looked at **Jackson cylindrical and Bessel** stuff, including the two related transforms
13 got hold of **Bateman two ET** volumes
14 reviewed Jackson's **charged disc** presentation

15-18 break time: refoam a speaker, Alta PS problem
19 **Legendre** Sturm-Liouville details figured out
20-23 break time: basement stereo, health care, MRL taxes, motion light
24-27 doing the **Legendre properties** doc.

**April 2010** iris and disk attempts

1-13 White Rim trip and other matters
14 reason why disk allows cylindrical but not spherical coordinates.
15 integral equation for the **iris**
16 integral equation for the **disk**, trying to solve it, cannot
18 more fiddling with **ring** Green's function problem
20 review of Fourier Transforms of Groups in **Hermann** book
21 find that there is no Green's for an infinitesimal **ring**!
22 Attempt #4 on the **disk** Green's
23 wrote up "the $\hat{\sigma}$" with good examples
24 attempt **iris** Green's using dual integral equations and Trantor
25 started **"transforms.doc"**, a bit overdue, then more iris attempts
27-29 more **iris** Green's
30 tried **iris** Green's by the reduced 1D Green's method, no sale.

**May 2010** toroidals, 1/R expansions, and the Big Jackson Hint

1 first look at **toroidals**, hoping this would help on disk, ring, iris stuff
2 made connection between **integral** of $1/\sqrt{a-b\cos x}$ and $Q_{n-1/2}(a/b)$
3 read a **PDF paper** on doing the ring Dirichlet problem in toroidals.
3-5 wrote " A study of **1/R expansions** in **spherical** coordinates.doc"
6-16 Cod/Lee trip
17-19 continued 1/R work, pondered "the Cape Cod idea" for expansions
22 wrote " A study of **1/R expansions in cylindrical** coordinates.doc"
23-24 working in "transforms.doc" doing cleanup
25 wrote " A study of **1/R expansions in toroidal** coordinates.doc"
26 noticed **Jackson** problem 2.10 **hinting** that you do Smythe 38 by inversion!
This is a *different* inversion from charged bowl ↔ on-axis disk Green's.
It is charged disk → bowl → iris Green's with charge in hole a la Problem 38.
[ At this time, I did not think of the simpler single inversion disk → iris directly.]
26-31 Torrey trip with Kent and M&A all visiting the 457 at once.

**June 2010** Smythe Problem 38 finally gets solved (in plane iris Green's Function)

4 visitors gone, start on the inversion path to Smythe Problem 38.
5-14 massive **double inversion effort** finally derives the **Smythe Problem 38** iris Green's σ
15 back and fill, also have the crude potential for the iris Green's (charge in hole)
19 still cannot do the iris integral equation, even knowing the right σ
20-21 obtained the potential for the iris Green's, and it gives the right charge
22 did **Smythe Problem 39**, taking Green's hole charge to a ring

23 got stopped cold by **Smythe Problem 40**, too bad, a bowl inversion thing.
24 learned about the **Green's Reciprocity Rule**, found big **error** in GR7 and emailed it off
24-26 wrote " Green's Functions using the Smythe Method **META**.doc"
27 reviewed **Jackson's** three chapters on electrostatics.
28 updated this **physics flow doc** from Dec 1, 2009, so did 7 months.
29-30 did Smythe **Problem 40** and **Problem 41**, understood the Reciprocity Rule

**July 2010** Analysis of the Charged Bowl; realized the simpler disk→disk inversion method. Final iris/disk Green results. Toroidals, atoms doc, parallel plates, Sneddon!

1-2 did Smythe **Problem 42**, now have capacitance of and σ on a **charged bowl**
3 wrote **algebraic integrals**.doc, realized **disk-to-disk inversion** possible,
4 more on **Kirk Princeton pdf** on the bowl
5 computed **in-plane disk Green's** function using disk to disk inversion
6 wrote up **comparison** of iris and disk Green's functions in the disk doc
7 wrote a new doc on the **Jackson inversion formulas** and methods, Chord Theorem
8 **redid iris Green's** using simpler disk to disk inversion method, agreed with double method
9 cleanup
11 some work on **toriodal.doc**, then tried doing bowl in toroidals, got close to Lebedev
12 ordered the **Boeing table** of Mehler integrals, also some in PBM
15 did **atoms** doc for all coordinate systems, appearance of "**conical functions**"
16-18 did Green's Function for **parallel plates** in Cartesians, help from a book
19 tried reading Canonical, was then motivated to go get Sneddon from Marriott, copy made
20-31 **read Sneddon's book** on dual integral equations etc, got the **Polyanin handbook** on IE's
27 copied the Boeing Report 246

**Aug 2010** Sneddon meta notes, conical functions, Cartesians, 1/R expansions

3-10 read **Sneddon Chap 4-8**, return Sneddon (cracks), return with 4 integral equation books
13 cleared up "**heat flow**" doc
14-18 review of **Sneddon**, meta doc (dinner for 33 in back yard)
19 perused **integral equation books**
21 assemble data on **conical functions**; review **sphericals 1/R expansions**
22 more work in the **Cartesians** area; **Cod** trip 24-Sept 6

**Sept 2010** House painting; review of past work, writing overviews relating to bowl things

8 writing **overviews** to existing docs
9-13 **1/R expansions** toroidal and cylindrical; then **addition theorems**
15 actually **solved** a Stakgold integral equation using Polyanin's book (the charged disk problem)
16-21 exterior 457 Club deck and **paint** maintenance, no math done
22-25 **overviews** related to "the half sphere problem", a historical one for me (Leg My Prob)
26-28 more **overviews** related to the bowl problem
29 more **overviews**: oblate spheroid; metal objects still not overviewed.

**Oct 2010** House painting: overviews for spheroidal and ellipsoidal worlds; reading Hobson;

learn conical coordinates;

4 **overview** for spheroid Green's, other **spheroidal** overviews
7 start **overviews** in the **ellipsoidals** world, Kelvin, etc
14 **start Hobson** on ellipsoidals (a copied from library chapter)
15- 31 **reading Hobson**, side trips to elliptic functions doc, Lamé functions, **conical coordinates**

**Nov 2010** finish Hobson, a Lamé look at WW, 3D SL, then Moon & Spencer, disk/iris overviews
electric field line drawing Maple program; major updates to Maple User's Guide

1-3 continue with **Hobson**, into the **Niven** theory now
7 show ellipsoidal normals are orthogonal, write **conical coordinates** doc
10 still reading **Hobson**, Maple does the $Y_{nm}$ in Cartesians
12 finish **Hobson**; then another review of W&W on Lamé functions
14 **Maple metric tensor programs** for different coordinate systems
15-16 did **Hobson meta** notes, then **meta-meta** notes and **overview**, more **WW Lamé** review
17 the **Weierstrass p** function and its Word symbol; start Moon and Spencer
18 the **Matrix Rollup Theorem**, Frobenius as done by M&S
21 ponder 3**D Sturm-Liouville** problems in general, Helmholtz in the sphere
22-24 **review of the Moon and Spencer** book, tried bispherical
24 **back to writing overviews**, now for disk, iris, and inversion stuff, Smythe problems
26 **Smythe problem overviews** -- found I could no plot electric field lines after 40 years
27-30 got a **Maple field line drawer** going for the iris; massive editing of my **Maple User Guide**

**Dec 2010** **review** the **Smythe** Problems, **Sneddon** Book, electrostatics **docs**

2-9 write Smythe Problem Overviews and other electrostatics related Overviews
10-18 do Sneddon review with overviews, write Matrix support doc for dual equations.
19-31 Cod trip and recovery, no work done.

**Jan 2011** 2/3 on the **2D integral EV problem**, 1/3 on **Toroidal Bowl**

1-10 the **2D integral EV** ( Sned motvt'd) (**Jim**, **Shankar**) Finish Sned review.
11-15 more on 2D EV and Lk=δ problem (Jim gets sol's) (**R Price** emails)
17-19 wrote integral/ODE comparison, wrapped all this up in a Sneddon subfolder
20-24 **bowl toroidal**: did the double-bowl, Ahlfors $f=\sqrt{1+\cos(z)}$
25-31 bowl capacitance, "doing Mehler integrals"

**Feb 2011** **The Charged Bowl in Toroidal Coordinates**

1-27 "grew" the Kirk doc into the **Toroidal Bowl Doc**, lots of work. The major task of this month.
made my own **P and Q Maple functions**
did both **bowl and toroid** stuff, lots of Appendices, 60 pages
found 2009 A&S; **toroidal capacitance function**, **thin ring** limit
started the **plucht website** on rimrockinteractive.net
**appendices** on: Kelvin, Smythe, Sneddon, Vinogradov

PDF export **graphics problems**
27-28 resumed bowl reading in **Canonical**, making notes

**Mar 2011 Publish Toroidal Bowl Paper, Review Stak, Start Stak Chap 7**

1-8 finalized the 60 page toroidal bowl paper, finally sent email to Kirk McDonald
finished bowl readings in Canonical, all annotated.
9-21 **review** all of Stakgold Chapters 1-6
22-31 doing heat part of Stakgold **Chapter 7**

**Apr 2011 Stakgold Chapter 7 all of heat part, start wave part**

2-9 finish heat conduction part of Ch 7, do "**heat exam**"
10-12 Laplace Transforms, wrote a new separate **Laplace Transform doc**, 20p
13 clean up the Ex 7.16 world
15-17 review heat part of Ch 7, more on Ex 7.16 but gave up on it
18-20 doing wave part of Ch 7
21 **Fourier Cosine doc** transform clean up
22-23 Ex 7.16 problem was an illegal "order interchange", wrote **order interchange doc**
24-30 continue wave part

**May 2011 Stak Chap 7 continues**

1 start **meta review** of Chap 7
3-13 Cod/Lee visit
14-19 recovery days, no physics work done
20-25 resume Chap 7 meta review
26 start Helmholtz section of Chap 7
27-31 Kent et all Mem Day Torrey trip

**June 2011 everything on hold**

1-11 Aruba Trip
12-30 no physics work done, XP on Alta, SW radio, eneloops, basement depig

**July 2011 Stak Chap 7 continues**

2-3 reading Chap 7 meta review prior to resuming Chap 7
4-10 resume new ground in Chapter 7, **Helmholtz** stuff, **KL transform**, knife edge
11-16 no physics work done
17 wrote Helmholtz meta notes
18 wrote **Bessel doc**, **KL transform doc**, **Hankel transform doc**
19 finish **Helmholtz section** of Chap 7
20 digression on "the **physics of air"**
21 found Stak's updated book on line
22 continue in Chap 7, plane wave, second wave midterm?

27 start **Weiner-Hopf**, defer mid-term
30-31 **finish** Chapter 7 text, start final exam

**Aug 2011 more Stak Chap 7, then digress into Stackel separation theory**

1-6 start "second mid-term exam", another **Bessel Function doc**
7-10 **Mellin Sine** Transform doc
11 attempt to write general theory of 2D equation separation (the big segue)
12-30 wrote **Stackel matrix doc**

**Sept 2011 Tensor doc rewrite month #1**

1 decided to "just update" my old tensor doc and put it on the web with the Stackel doc
2 **Levi Civita** stuff (after 8 year lapse),
3 problems with update: general theory missing, logic all wrong, area transform unknown
4-11 start writing a new Tensor doc to replace the old one
12-23 Cod/Lee trip
24- 27 **divergence section** done in tensor doc
29-30 Needles camping trip Bruce and Blairs

**Oct 2011 Tensor doc rewrite month #2**

1-5 camping trip recovery
6-8 resume writing tensor doc, contravariant by definition
9-12 gave up on internal summary chapter, start we-removal
14-24 first draft is 120 pages, Jacobian problems, rewrite intro, check results
25-30 another rewrite of area volume length section, then "meaning of x'-space" issues, App C

**Nov 2011 Tensor doc rewrite month #3**

1-5 we-removal, spell checks, add inverse transform stuff edit passes,
6 I think it is done (wrong), PDF production, Gwen Mac test is positive
7-19 is curl a vector issue, then tensor densities and App D and ε tensor, Levi sum rules
20-24 finally start looking at historical docs, 1900 bit year RLC, words contra and covariant
25 rewrite special relativity section, more edit passes, clean gradient, 191 pages and done
26-29 prepare Stackel for web site
30 redo **website**, removed Word docs, site now has just 4 PDFs'

**Dec 2011 Finish off Stakgold Chapter 7**

4-7 Stakgold **errata** and email with same
8-11 resume tail end of **Chap 7**, meta notes
12-19 Cape **Cod** visit and 2 week cold begins
25-27 finish Ch 7 meta notes including Wiener-Hopf
28-31 Stakgold Final Exam problems done

**Jan 2012 Review Goldstein, M&F, then Lai Ch 1-Ch 3**

1-3 finish Stakgold Final Exam, write Ch 7 meta meta notes, published Errata
6-n scan of M&F, both vol I and II
7-8 Goldstein on virtual displacements, review entire book,
15-17 start into Lai in PDF, all of Ch 1 done.
18 M&F dyadics
19-24 I find ($\nabla \mathbf{v}$) in Lai is new to me, having trouble getting Lai results
25-26 put this in tensor doc at some initial location
28 Lai book arrives, was $7, now reading Ch 3 kinematics of strain

**Feb 2012 Lai Ch 3 - Ch 4, heavy tensor doc updates**

1-2 polar decomposition theorem, Lai raw to p 105
3-8 wrapping up Ch 3, more effort on ($\nabla \mathbf{v}$) stuff
9-10 tensor doc transpose, Appendix E (expansions) and F [($\nabla \mathbf{v}$)at that time, now G]
13 Word pagination problem
16 add section 5 (o) on continuum mechanics of tensor doc
17- start Lai Ch 4 on stress, ran into divT object
21-23 tensor doc Ch 8 is conflicting with Lai, doing rewrite
26 proofings and updates, handedness section
28 section 8 keeps getting upgraded, general areas now etc.

**Mar 2012 Lai Ch4 - Ch 5, tensor doc Appendices F, H, I**

1-2 affine connection Appendix (was G, now F)
3 decision to split off the Appendices, TOC problem not yet understood
4-6 more affine appendix work
6 divT goes into Appendix H
7-8 Section 15 on covariant method
11 web update of both tensor docs ($\Sigma$=264p), Stackel doc and Maple doc
17 at Lai Ch4 p 179
19 squirmy integrals p 188, finish Lai Ch 4, start Ch 5
21-22 Lai p 211 elastic isotropic solids, Navier-Cauchy equations
24 vector Laplacian, errors in tensor doc Sec 15 got fixed
25 big covariant derivative theorem in tensor doc
29-31 wrote Appendix I on vector Laplacian

**Apr 2012 Plug along in Lai Ch 5, ongoing tensor doc changes and additions**

1-8 Ch 5 p 224, then 231, then 247, then 264, Problem 5.71
9-10 long Section 7 (i) on transpose and matrix multiplication
11 solved the Word TOC mystery
14 Ch 5 to page 279 on plane stress problems
16 published tensor doc and user guide, my earliest retained version of tensor doc
17-28 Cod-Lee visit

29-30 nada

**May 2012 Continue Lai Ch 5 on elastic solids, start Ng course**

1-4 nada
5 meta notes for Ch 5
6-13 Ch 5 to p 301 on indenters; starting Ng course
14 Ng Section 8 on neural nets
16 Lai start anisotropic elastic solids
18 writing up massive Ng notes, put on line on 20th
24-31 Torrey trip with Kent, Mem Day 2012

**June 2012 Finish Lai Ch 5 and Ch 6, start Ch 7, wrap up Ng**

2-10 finish Lai Ch 5; doing Ng every day
11-16 Ng meta notes, video #15
17 started promoting my Ng PDF in forum
19 Lai start Ch 6 on Newtonian fluids
24 Lai to p 385, Ng is over and calming down
27 Lai to p 401
28-30 Lai finish Ch 6, start Ch 7 on Transport Theorem

**July 2012 Write Frames Doc**

1 frames confusion in Lai, G Rule in Goldstein bugaboo, start frames doc
2-31 writing frames doc !

**Aug 2012 Continue writing Frames Doc**

1-18 continue writing frames doc, it has a life of its own now.
20-31 Cod and Lee visit

**Sept 2012 More frames doc and tensor doc, fin Lai Ch 7, do most of Lai Ch 8**

1-4 Cod recovery days
5-11 Foucault section of frames doc
12 web site update ten∂sor doc, frames doc
14 Lai review Ch 6, review Ch 7 then resume in Ch 7
16 finish Lai Ch 7
17-21 frames doc additions, fictitious torques
22-25 start Lai Ch 8
27 wrote "essay on covariance", tensor doc updates
28 tensor doc App K (formerly called J) on deformation tensors

**Oct 2012 tensor doc, finish Lai Ch 8, Lai errata sent to Lai, start astro doc**

1-2 add mixed-bases expansions tensor doc App J
4-8 small Torrey fall visit
12-20 doing Appendix on (**∇T**) calculation and other tensor doc work
21 finish Ch 8 including meta notes; web re-release on tensor and frame docs
22-24 wrote Amazon short review (not submitted yet) and Lai errata, Lai responds!
24 frames doc update
26-31 start and work on astro doc (sun earth kinematics doc)

**Nov 2012 astro doc**

1-19 insolation, sunrise azimuth, analemma, equation of time, Maple analemma, Crimea
20-26 overview and proofing, arctan appendix, Ukraine discrepancy

**Dec 2012 astro doc**

1-13 Cod trip and recovery
14-31 Greek analemmas, section rewrites, AFIB hits Dec 23, figure index

**Jan 2013 finish astro doc and start Galois doc**
1-8 film projection calculation, gallery, first PDF, proofing and done with astro doc
9-29 start Galois doc, vector space idea added, start cyclic codes, Maple code

**Feb 2013 finish Galois doc**
1-4 Kent Judy visit
5-16 proofing Galois, PDF made, it is done.
17-31 Beth Mac book, RDT closure, taxes, Medicare research

**Mar 2013 spectral doc**
1-11 start spectral doc, DFT repair
12-15 break in, metal plate, floaters, Jim black PC, Marg backup
16-31 correlation, spectral density, cleaup, appendices, Change/Hold, NRZI

**Apr 2013 spectral doc**
1-13 right knee problem, White Rim, Grauer, Jon Guerts Moab
14-17 Fourier/Hilbert transform
18-30 Cod trip and recovery

**May 2013 finish spectral doc**
1-5 term SH, MRL taxes
6-19 snags , proofing, summaries, done
20-22 Philips pension
23-31 Torrey trip, Kent visit, back problem, TIAA plan, retire spreadsheet

**June 2013 start scrambler doc, pause for Galois update**
1-9 Medicare starts, new washer, Philips notary, passwords
10-29 start scrambler doc, redo drawings, Maple work, remainders

30 update to Galois doc starts

**July 2013 finish Galois update, resume scrambler doc**
1-11 Galois update, CRC, App G (Fermat theorem, number theory)
12-31 resume scrambler doc, matrix stuff, MLS spectra, random variables, Jim dies

**Aug 2013 repairs to spectral doc, then resume and finish scrambler doc**
1-9 back in spectral doc again for major repairs
10-16 Cod trip and recovery
17 resume and finish scrambler doc

**Sept 2013 start lines doc; this will consume 14 months = 61 weeks ≈ 1 year**
1-12 start into lines doc
13-16 Kent and deck repair
17-26 more lines doc
17-30 Cherie Jim Event and recovery

**Oct 2013 lines doc**
1-31 lines doc all month, every day

**Nov 2013 lines doc**
1-7 lines doc work
8-11 Torrey Diane
12-30 lines doc work

**Dec 2013 lines doc**
1-18 lines doc work
19-28 lines doc work
29-31 gave assist to Mr. Agassi on toroidal coordinates

**Jan 2014 lines doc**
1-31 lines doc work (end with Cold Day #4)

**Feb 2014 lines doc and Bipolar doc**
6 generalized all King stuff to magnetic conductors
1-12 finish lines doc and put on web as **first release**, decide not to update Coax Doc
15 gaping flaws in lines doc noted
17-25 wrote **Bipolar Doc** and released it
26-28 find Pozar, worry about surface currents, H perp at surface

**Mar 2014 lines doc and radial Hall effect**
2 two paradoxes, $E_\theta$, more Debye surface current work, $\varphi$ to $\theta$
9 $J_z$ asym even at DC, the whole $\omega = 0$ limit of the theory at risk
27 **radial Hall effect** and Hall appendix
1-27 basically my theory is failing at $\omega = 0$, reason not yet known

**Apr 2014 lines doc and eddy currents**

1-15 **eddy currents** work
16-26 Cape Cod / Lee

**May 2014 lines doc and $Z_s$ averaging**

1-6 more eddy current work, in an appendix
11 how do deal with $Z_s(\theta)$ versus $Z_s$ = constant, gaping flaw from Feb 15
12 back to the $\omega = 0$ complex of issues and problems
23 Mem Day Torrey weekend

**June 2014 lines doc**

4 symbol summary, how to plot field lines appendix, trip to Ft Collins
14 proofing of many appendices
18 made a PDF
26 radial Hall does not explain the $\omega = 0$ mystery
30 new version of the network Appendix K

**July 2014 lines doc**

1 messing with App Q on limits of $Z_0$ and k
5 App R on Belden cable redone, attenuation model fails; Marrouche visit
15-24 Cod / Lee trip
29 energy conservation section

**Aug 2014 lines doc**

1 update Visio index, release lines after 40 weeks labor (**second release**)
2 $\omega = 0$ problem persists, however. Try reflection again, asym at $\omega = 0$ persists
11 infinite B fields discovered at $\omega = 0$ (curl E problems)
16 Debye currents? Review all the usual suspects once again (4th time?)
22 E. Voight visits
30 better models for parameters R, C, L and G, more App Q rewrite

**Sept 2014 lines doc**

1-8 App Q work, small and large $\omega$ limits of $Z_0$ and k and parameters
18 still grinding away on low $\omega$ failure of theory
20-30 Chapter 7 written on this topic of $\omega = 0$ problems, face the music

**Oct 2014 lines doc**

1 problems with $n_c$ and $n_s$; Chap 7 explains why $\omega = 0$ limit is bad
9 heavy review, update Visio and Maple index
10-18 proofing and pagination
19-20 **third release** of lines doc; release on 20th

**Nov 2014 AFIB and Black PC**

1-10 AFIB research on **stroke and bleed** rate papers
10 deliver letter and directive to LS, never heard back as of 12/11.
13-18 work on **Black PC**

23-30 **Cod** Tgiving visit

**Dec 2014 cosmology book and blackbody problem**
1-8 no work; updated AFIB papers and email to Brent, no reply as of 12/11/14
9-15 review of books, physics boxes, courses taught, etc and Staples recycling
16-25 Cosmology 101 and blackbody
25-31 blackbody sent me to Schiff and thence to Lagrange doc (coming soon)

**Jan 2015 Buck restart after many years, and start AFIB papers**
1-15 Buck Ch 4 and Cosmology 101
15-31 the two AFIB docs started here; got nice China email on my docs

**Feb 2015 finish AFIBs, resume Buck, update four docs**
1-15 finish AFIB docs
16-28 Buck Ch 6 (Spock dies) Update Tour, Maple, DNA and Ng docs.

**Mar 2015 update Bipolar Doc, start Researchgate**
1-31 update Bipolar doc, activate Researchgate for docs
5-11 Cod Lee

**Apr 2015 update Tensor Doc**
1-30 major tensor doc update

**May 2015 resume Buck, then start Lagrange Doc**
1-15 resume Buck at Ch 6
16-30 start Lagrange doc (led there from Buck on extremal things and blackbody)

**June 2015 finish Lagrange Doc, resume Buck**
1-20 finish Lagrange doc
20-31 resume Buck again Ch7 and encounter differential forms

**July 2015 Buck handoff to Sjamaar on differential forms**
1-31 start Sjamaar PDF book on differential forms

**Aug 2015 finish Sjamaar**
1-31 finish Sjamaar PDF book on differential forms

**Sept 2015 start Wedge Doc**
1-30 start wedge doc, read some fiber bundles and tensor products

**Oct 2015 Hawaii and resume Wedge Doc**
7-14 Cod visit
18-25 Hawaii trip with Romines and Honings
other continue wedge doc with its three part title

**Nov 2015 continue Wedge Doc**

1-25 continue writing wedge doc
25-30 switch to a Bowl Doc rewrite due to a received email

**Dec 2015 switch to a lengthy Bowl Doc update**
1-31 bowl doc update

**Jan 2016 finish bowl, resume wedge**
1-5 finish bowl update
15-31 resume work on wedge doc

**Feb 2016 wedge doc**
1-9 MRL 100th birthday week and recovery
10-29 resume wedge doc, Chapter 10 on differential forms

**Mar 2016 wedge doc**
**5** question comes in regarding frames doc mws files
22 non-square matrix algebra
1-31 all month on wedge doc diff forms Ch 10

**Apr 2016 wedge doc**
1-30 trying to stabilize wedge doc sections 10 and 2.11 on $\lambda^i$
23-27 Maze trip Curt and Cadys

**May 2016 wedge doc**
1-15 finalize chapter 10, proof all
15 update of tensor doc
20 released first cut wedge doc and a new tensor doc, but
21-31 solo Torrey trip for railing and inventory

**June 2016 finish wedge doc**
5 new releases of tensor and wedge doc
10-11 2nd Torrey drip, grout the shower tile
12-30 457 house maintenance, no phys work done

**July 2016 no phys work done.**
1-5 Torrey 4 July trip, Dave, Callas
12-25 Cod/Lee trip

**Aug 2016 no phys work done.**

**Sept 2016 Goldstein resume then update work on Lagrange doc**
16 start review of Goldstein, but did not get far.
17 pondering virtual displacements, related to constraint surfaces
21-23 App C and D of Lagrange doc, on constraint surfaces
24- 30 trying to connect Goldstein ch 2 to lagrange doc

| | |
|---|---|
| **Oct 2016** | **Lagrange doc problems**. |
| 1-5 | pulled Lag doc from xmission and RG ! Fly in ointment. |
| 5 | am now in Ch 3 of Goldstein review |
| 6-30 | wrote entire new lagrange doc paper |
| | |
| **Nov 2016** | **Euler doc, start update of frames doc** |
| 1-11 | write and release Euler Subs doc onto xmission and RG |
| 12-16 | Goldstein Ch 3 on orbits, then start Ch 4 review on rot |
| 17 | decided this was a good time to update frames doc |
| 18-30 | frames doc errata done, shuffle appendices a bit |
| | |
| **Dec 2016** | **frames doc: tether/dumbbell work** |
| 1-8 | frames doc work on tether, renumber sections and equations |
| 14-18 | start work on dumbbell/tether satellite |
| 19-28 | Cod trip |
| | |
| **Jan 2017** | **frames doc** |
| 1-15 | dumbbell, first orbit plots |
| 16-20 | work on tides section |
| 21-31 | more frames finalization |
| | |
| **Feb 2017** | **frames doc** |
| 1-8 | am "ready to make a PDF" |
| 9-10 | reading Goldstein Ch 4 to make sure nothing is left out of frames doc |
| 11 | am stymied by the Goldstein **ω** formula on page 134. |
| 13-14 | App G on sandwich rules etc |
| 15-18 | Goldstein Euler angles and rigid body into frames doc |
| 19-28 | Full rewrite of Section 1.1, more general frames doc repairs |
| | |
| **Mar 2017** | **frames doc** |
| 1-5 | the Goldstein ω paradox persists |
| 6-25 | wrote App I on rigid body, App J on tensor doc |
| 26-30 | add work on electric dipole rotor and mag rotors, now 426 p |
| | |
| **Apr 2017** | **finish frames doc** |
| 1-7 | finalize frames doc and release |