Introducing mechanical propulsion

Empiricism: A Radical New Approach to

traction in the 19th Century

'Learning comes from experience and observation'

The Future of Transport

- ◆ Cutting transport costs
- ◆ Cutting animal numbers
- ◆ Cutting transit times
- ◆ Cutting manpower requirements
- ◆ Eliminating rest periods/ traction changes
- ◆ Cutting hay and oat consumption
- ◆ Cutting emissions – cleaner p/way
- ◆ Cutting maintenance and servicing
- ◆ Expanding markets
- ◆ A new tool in the 19th Century technology cupboard

What the Engine Lacks...

◆ Mouth to object
◆ Teeth to bite
◆ Mind of its own
◆ Hooves to kick with
◆ Dirty exhaust
◆
◆
◆
◆
◆ Hmm, er, sorry guys, it hasnae steering

Historically accurate?

… and what it doesn't

One piece construction:-

Boiler shell forming locomotive frame
Slam action valve gear
Single Cylinder Piston assembly and axle –
    indirect drive
Inconvenient tendency to stick on dead centre

Feed pump that doesn't always work

And, er, a tendency to go straight on at bends

Trajan – the origin of the problem

Invent first, then build. Only then can Empiricism take a hand

The Wheel has – or had – one intractable problem

If you push it, it refuses to move in a straight line, as Newtonian mechanics – superficially at any rate – suggest it should

So wheels had to be pulled – you had to put the horse before the cart, not vice-versa

Take awa' the horse – as Mr T did – and the problem that Trajan's contemporaries made a three millennia-old proverb – turns around and bites you in the bum

If you don't know what the problem is, then Empiricism will not point you towards a solution.

However, you can get lucky...

The problem we set out to solve...

Moving the products of the World's Largest Ironworks to help beat the World' Nastiest Dictator (who developed state control to a point that allowed the world's nastiest dictator – to date - to do his worst later)

And the (other) one we didn't...

Currus Bovem Trahet Praepostere

Geordie Ironfounder Rescues Mankind!

Tyneside newspaper headline of 1809...?

At this point there are a number of rail 'guided' transport systems, having a common feature: they only work if you keep the horse

- – Flange on rail
- – Flange on wheel
- – Two flanges on wheel
- – Oval rails (and Flanges)

I could go on, but it is obvious that, in the absence of Knowledge, lots of people are addressing the problem they don't know the physics of, by having a guess.

- – And that includes the anonymous Foundry Wallah

Differential Contact Point Diameters

Three major components

*   Axle

*   Two wheels with tapered edges because the casting is cleaner that way

*   Luck – in making this – the coned wheelset – because it's Tyneside, and Tyneside uses edge rails and wheels fixed solid on axles
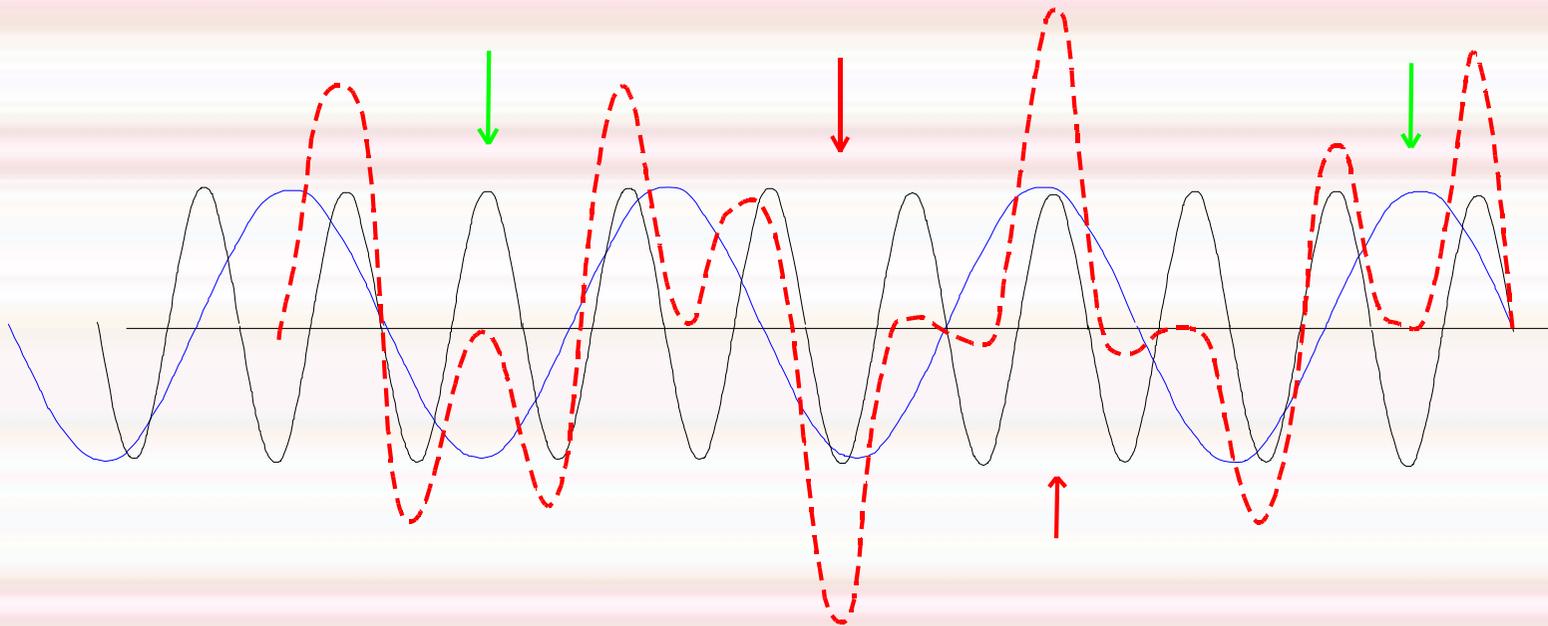
Now Empiricism can be invited on board the locomotive railway to enjoy the ride

Please note that mathematical analysis of this fundamental – for rail - only arrives in 1915, fully fifty years after the problem itself (Currus Bovem) is at last solved..

After fifty years...
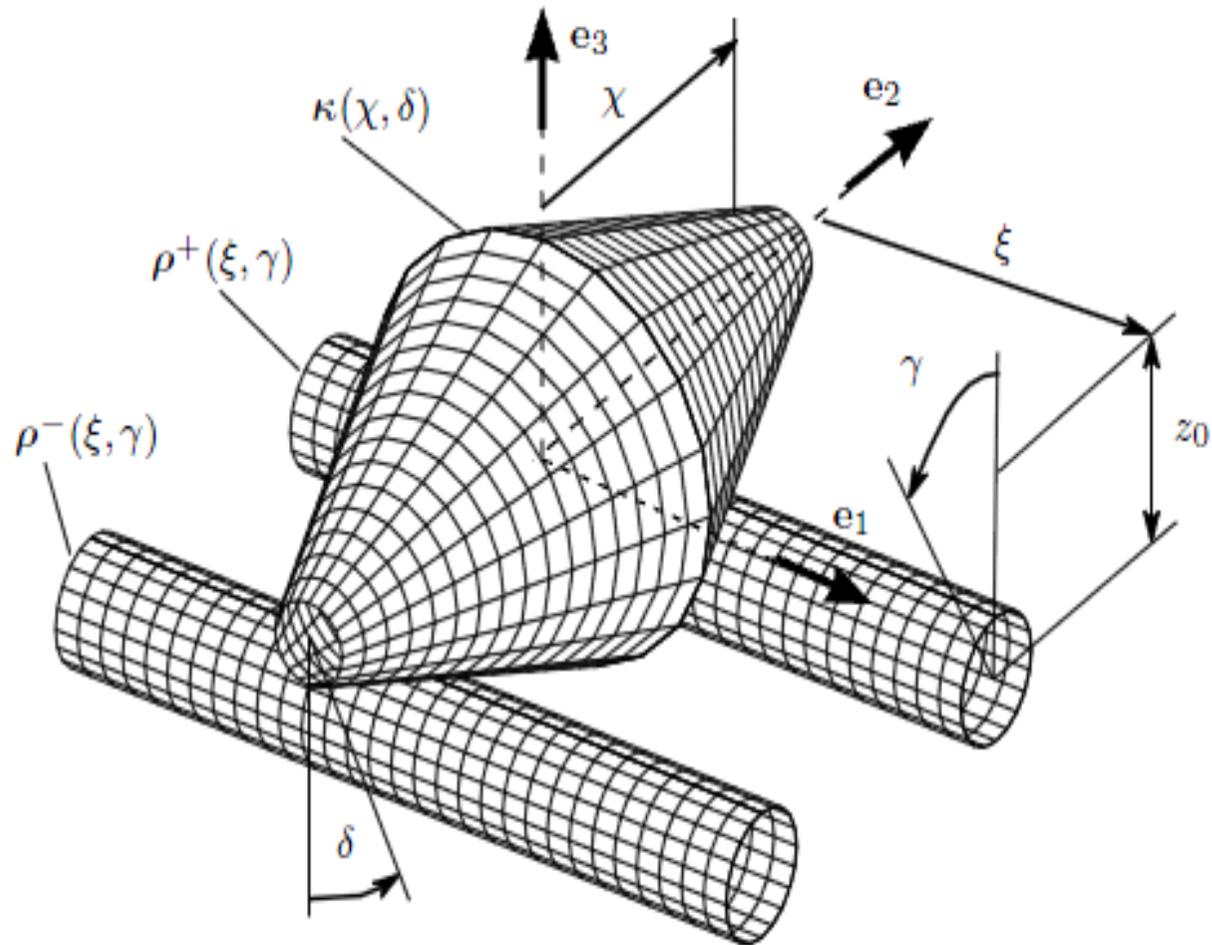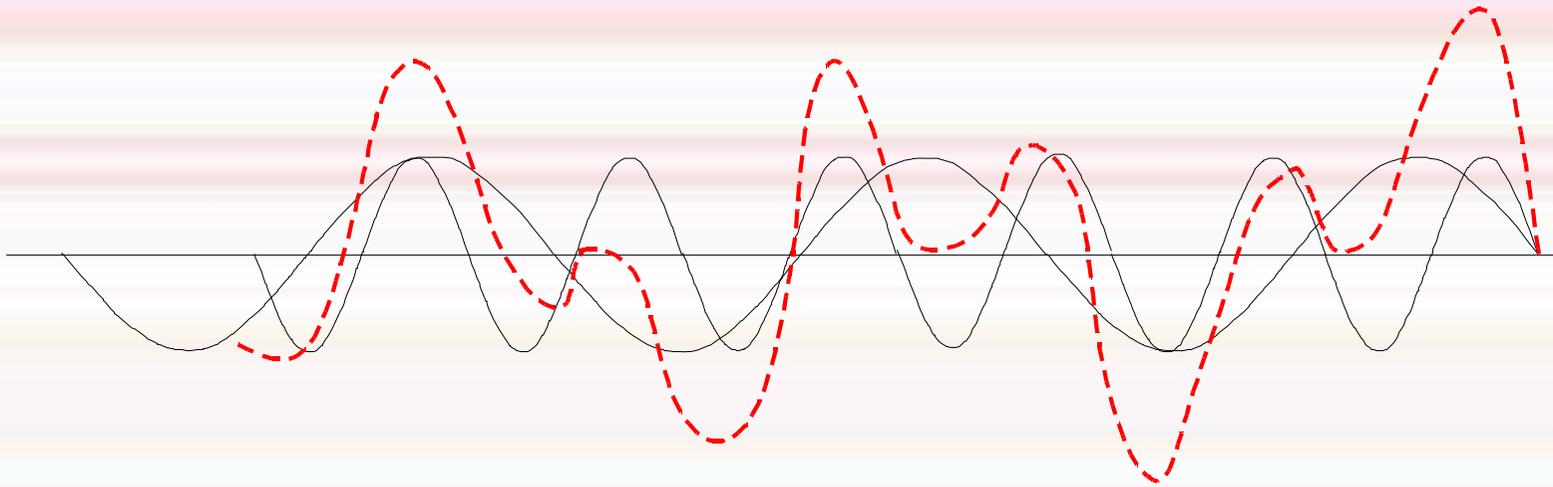
When a little graphical representation...
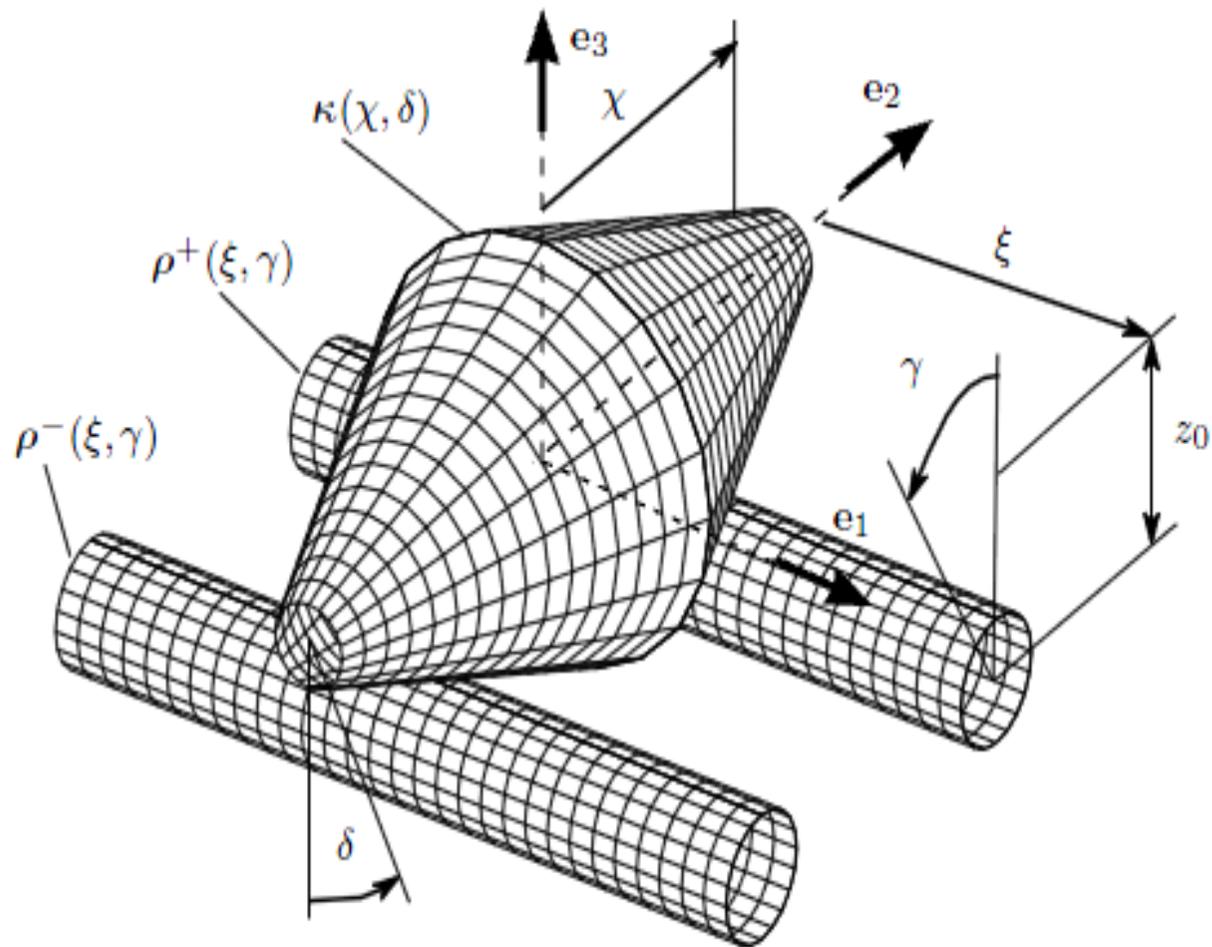
Tells you a great deal
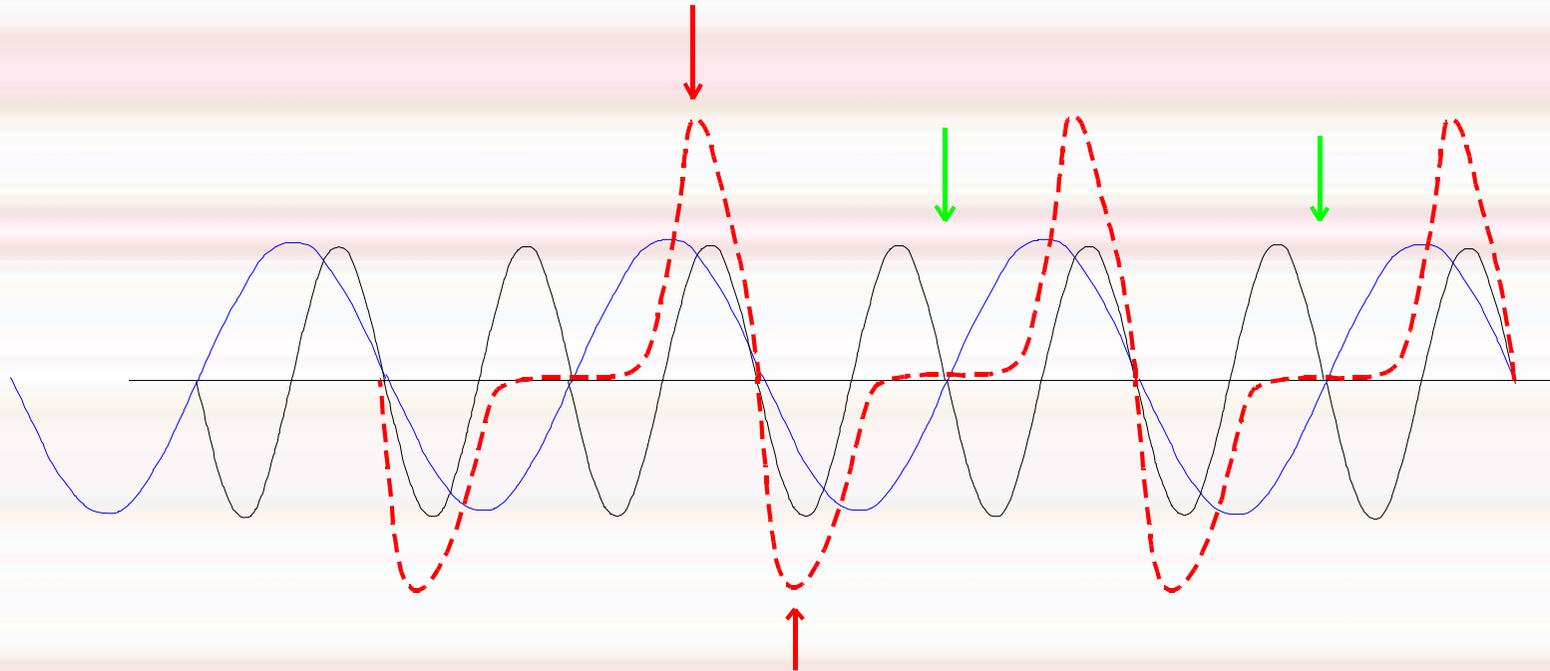
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About just what the problem is

11.5:6

Track gauge...?

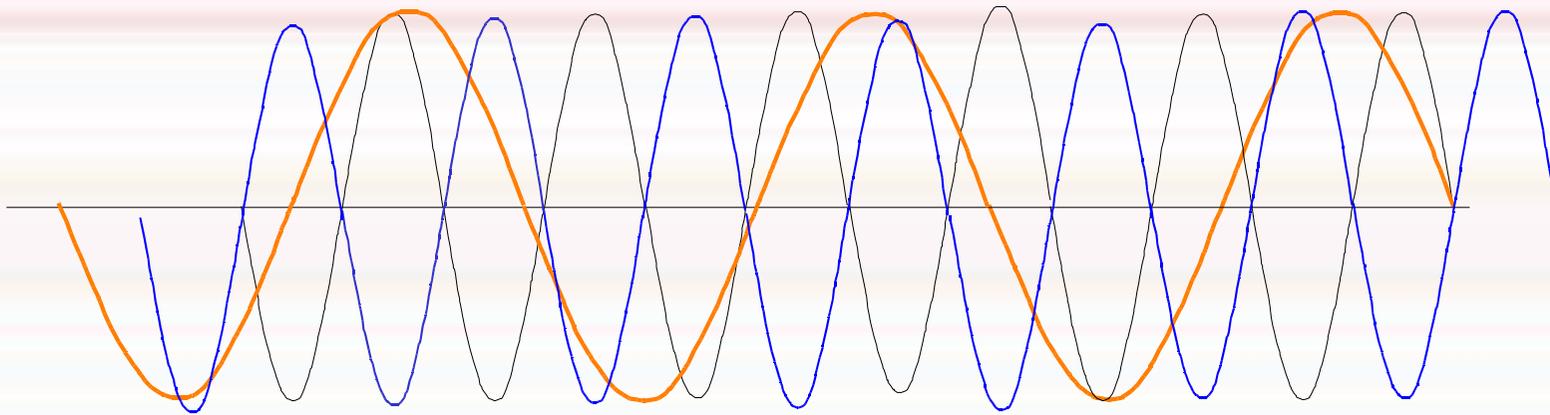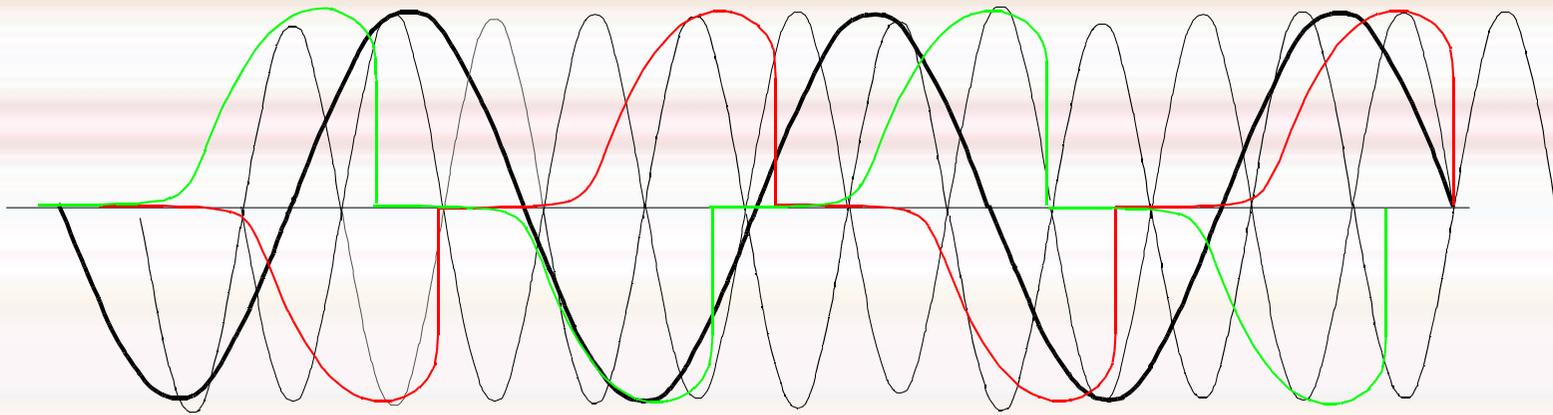# *Two Axles Bad, Three Better!*

11.5:6

And a little piston thrust...

11.5:6

Engine-perfect 1845-style