

Iron on Z: Updates



PRESENTED BY

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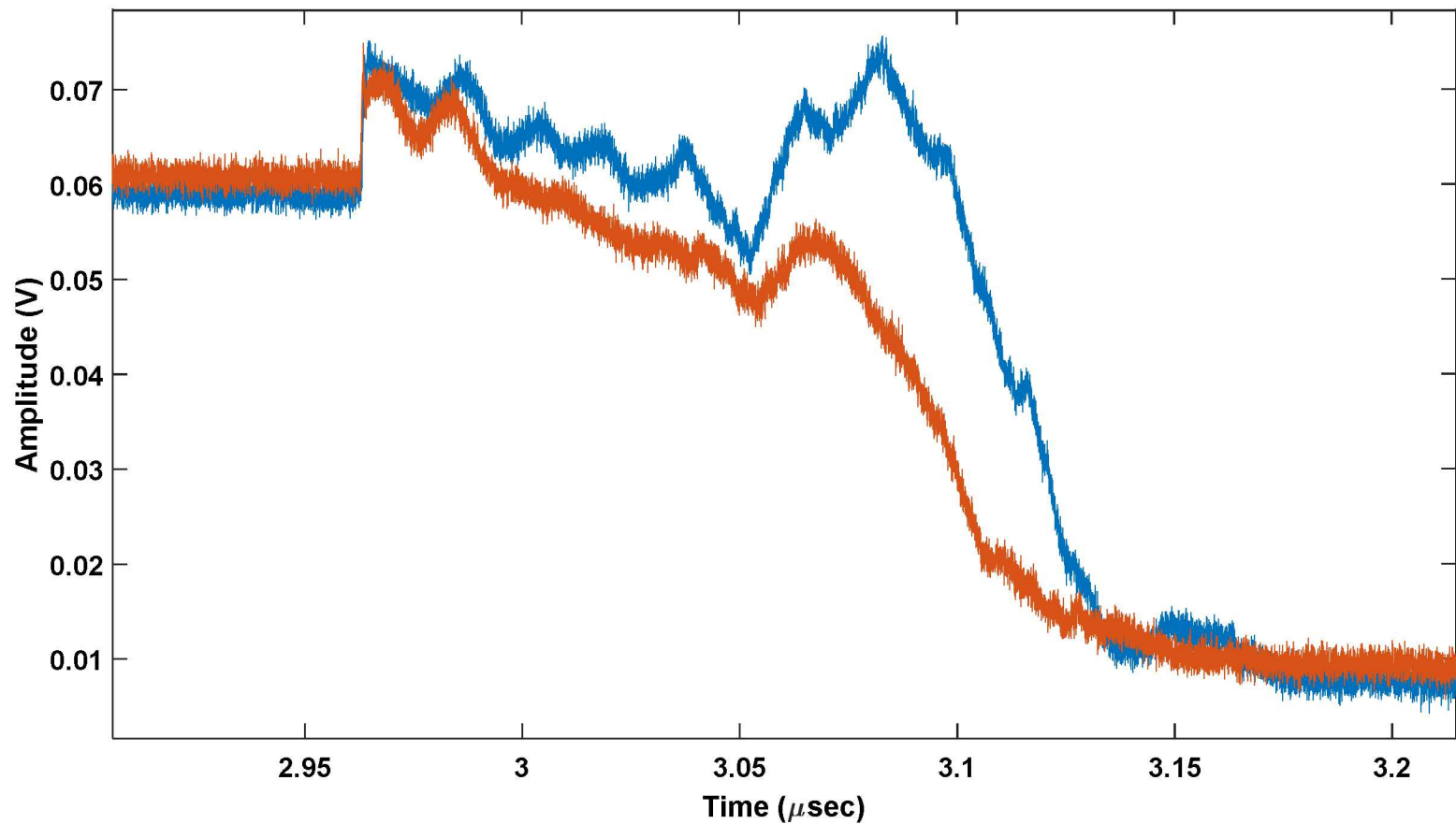
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Experimental Setup

- These results come from two Z experiments, Z3155 and Z3260
- Both were strip-line style DMP experiments which fielded only iron and LiF samples
- They used shock-ramp pressure drives, with an aluminum panel/impactor
 - Pressures in the iron were 275 to 400 GPa

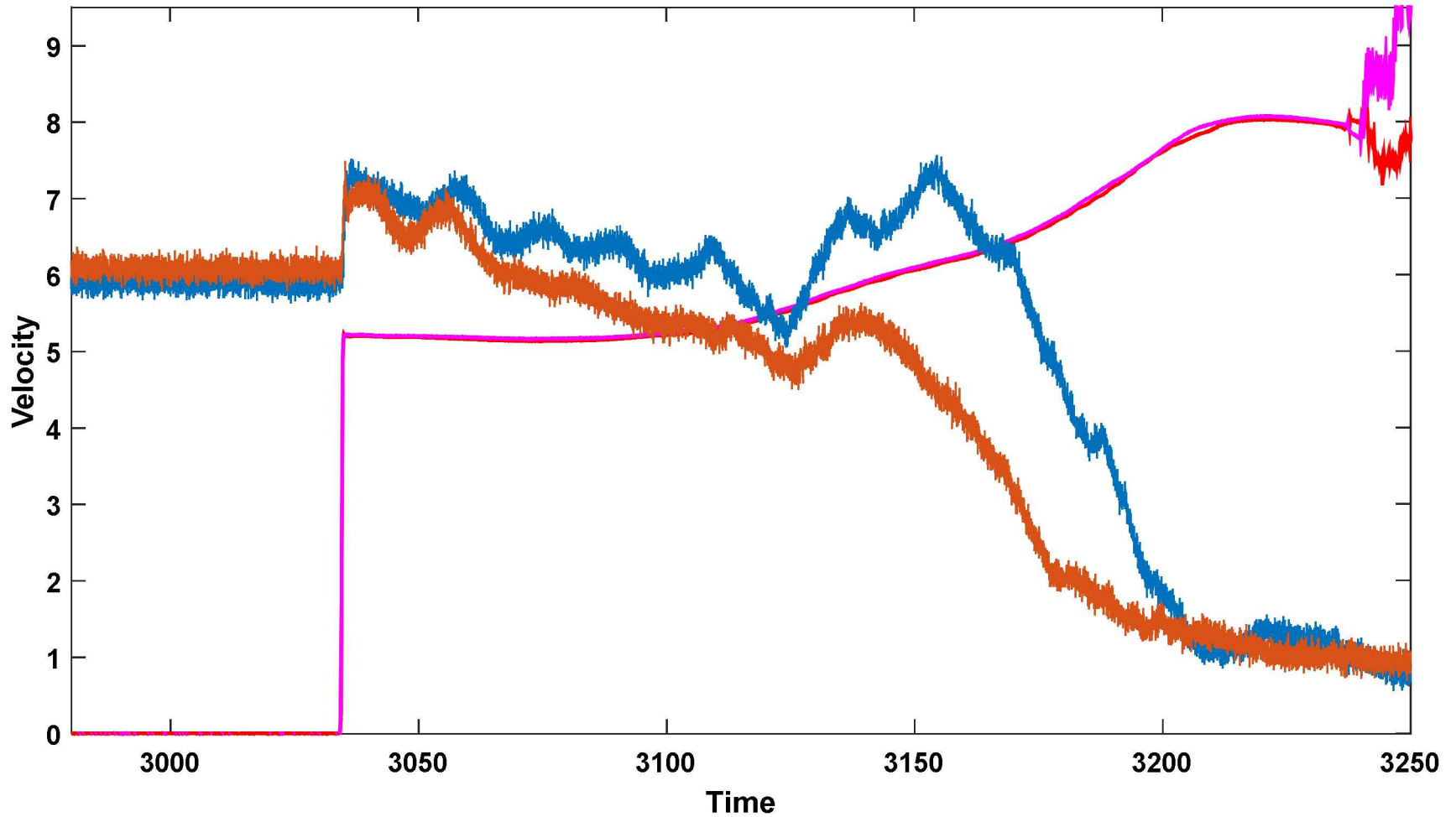
Ellipsometry

Ellipsometry Raw Data

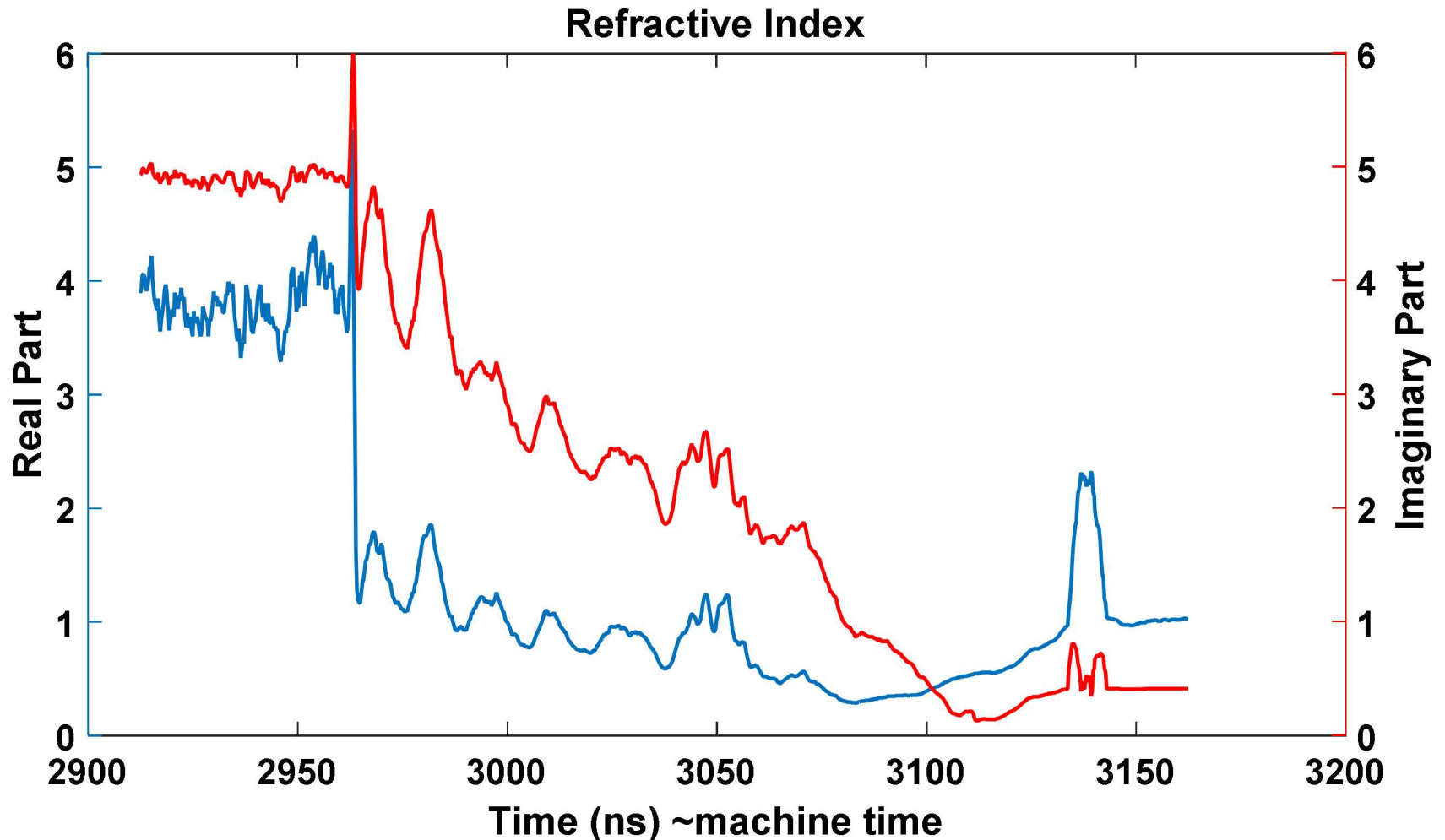


Overlaid with VISAR

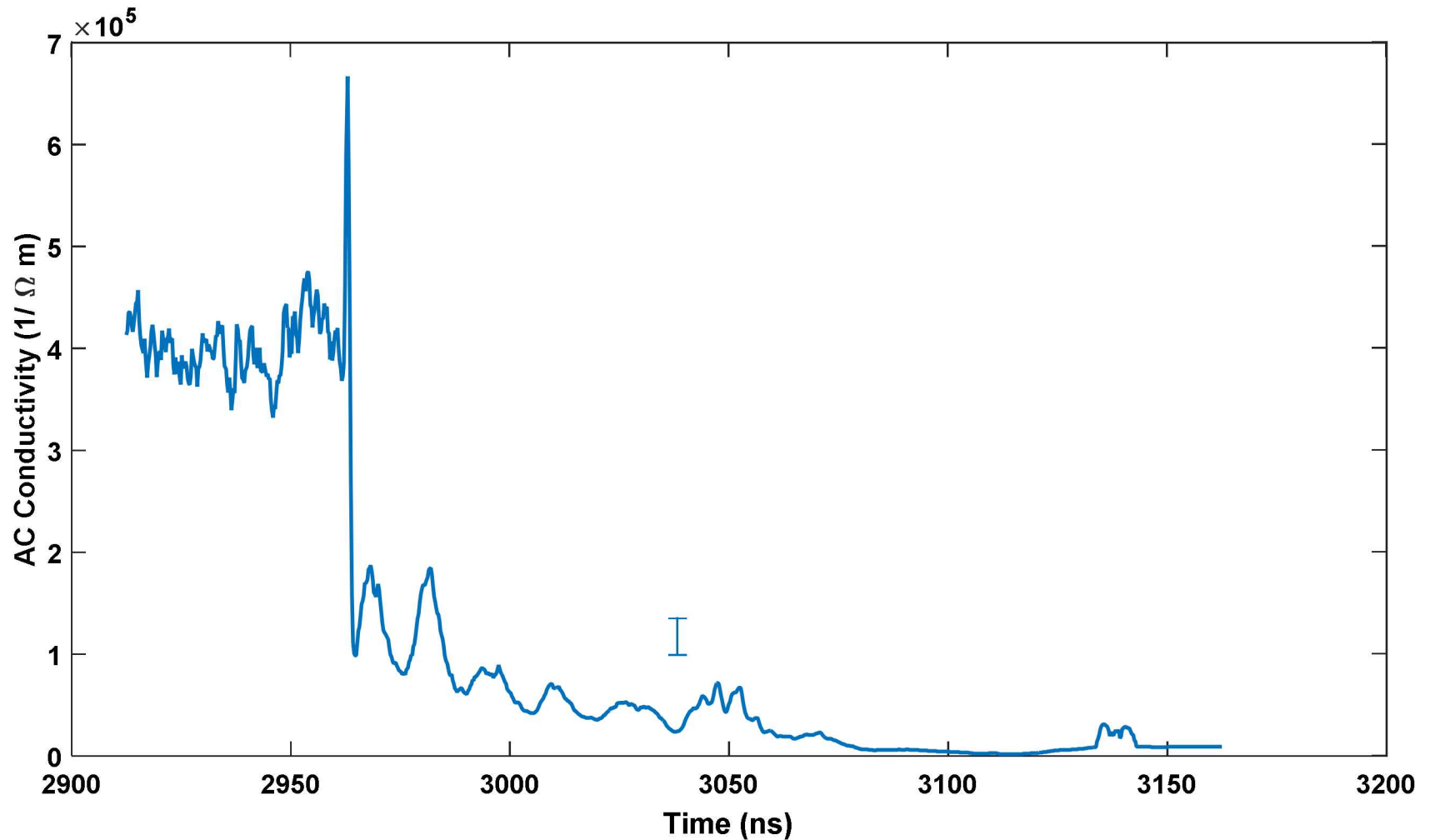
Results



Refractive Index, from smoothed data

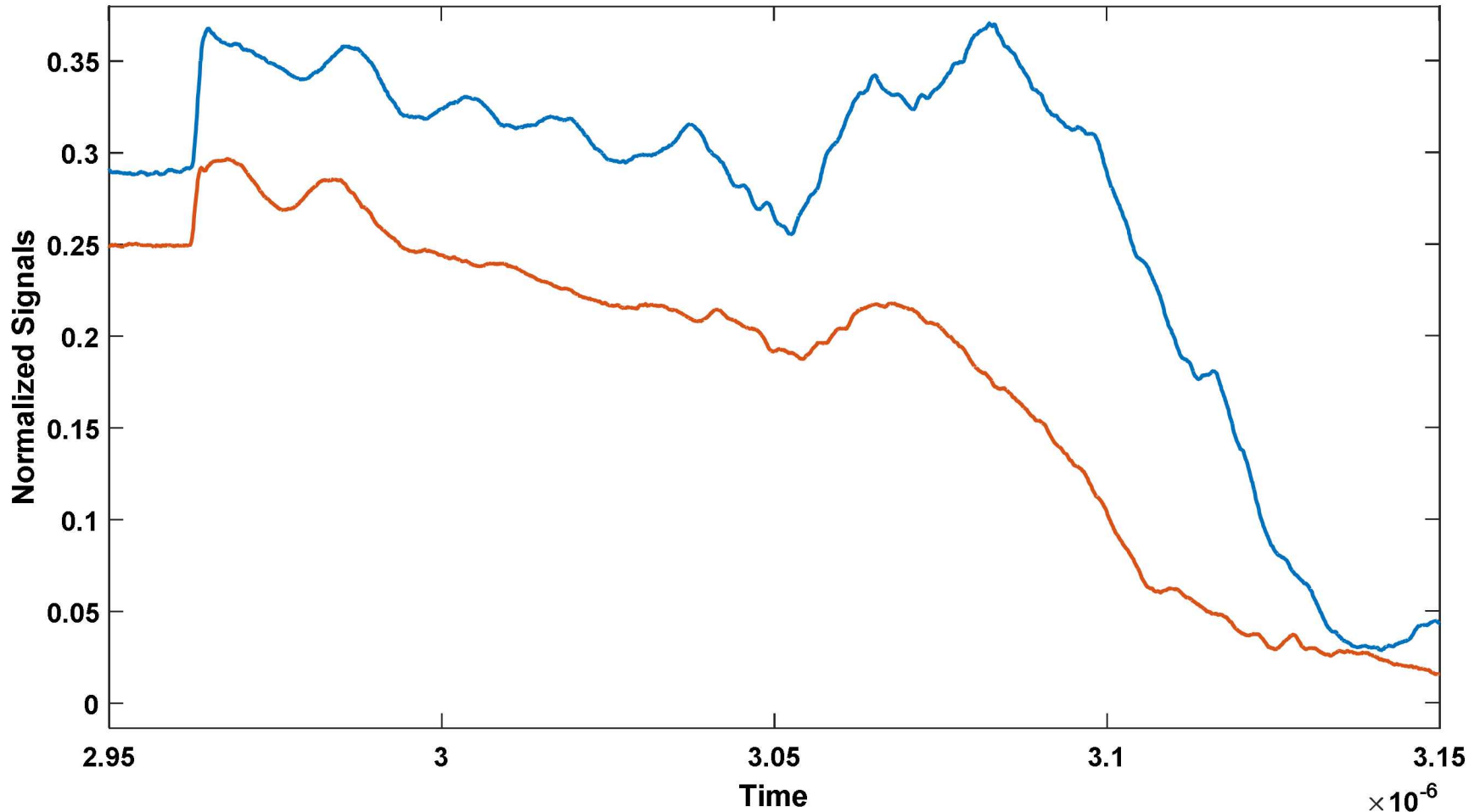


AC Electrical Conductivity

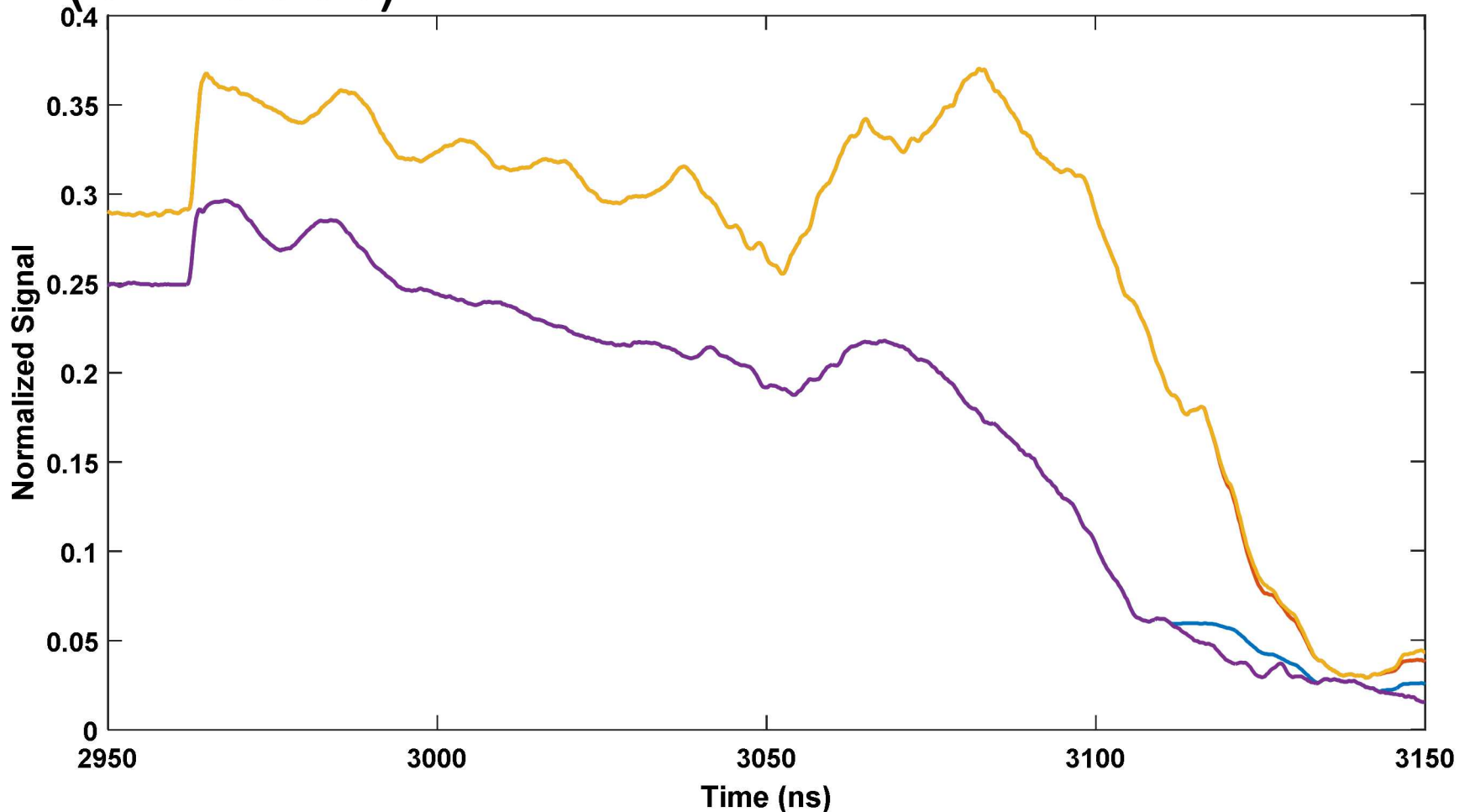


Analysis Technique Validations

Normalized and smoothed ellipsometry data

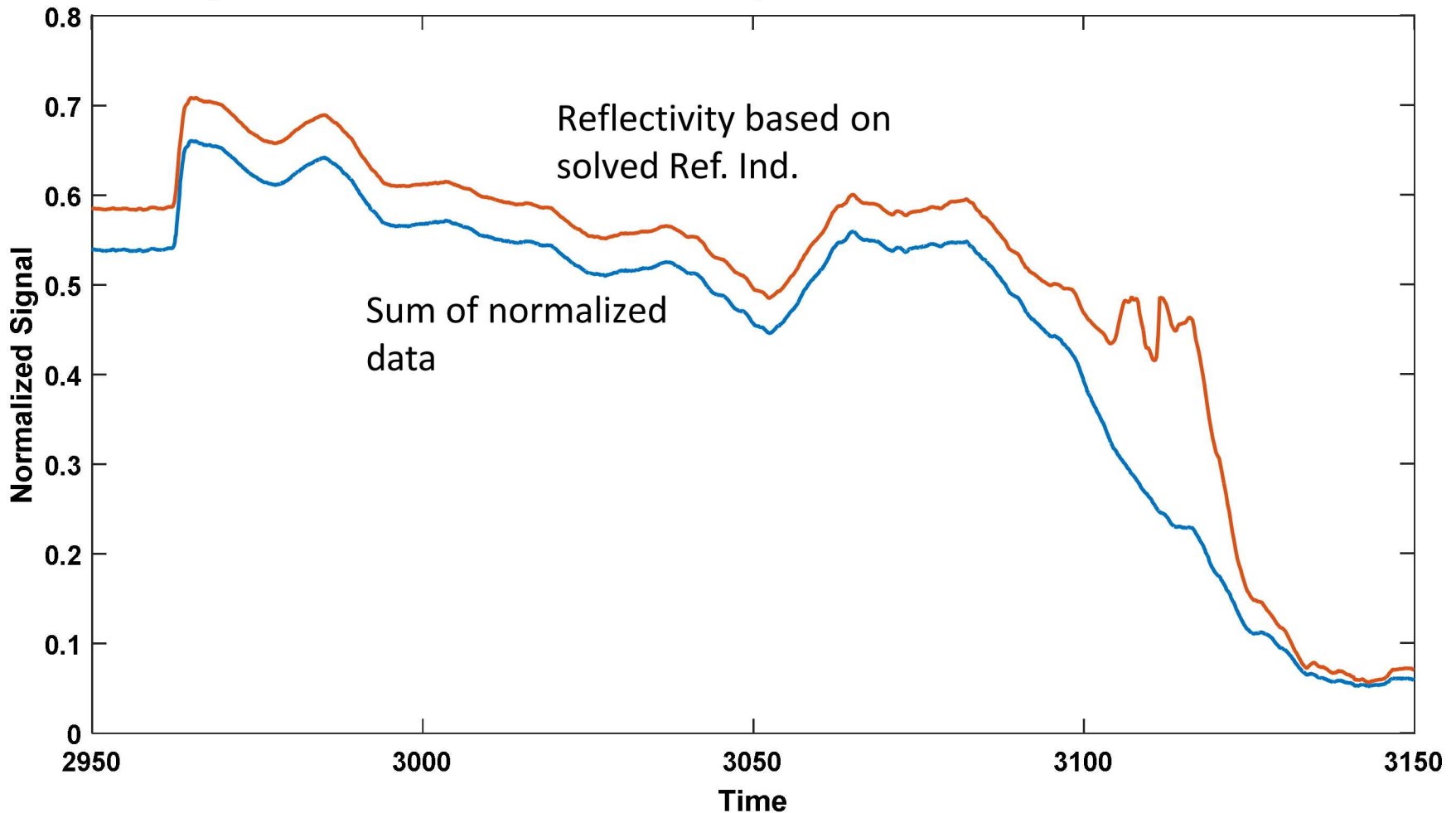


A good local minima was found (at least)



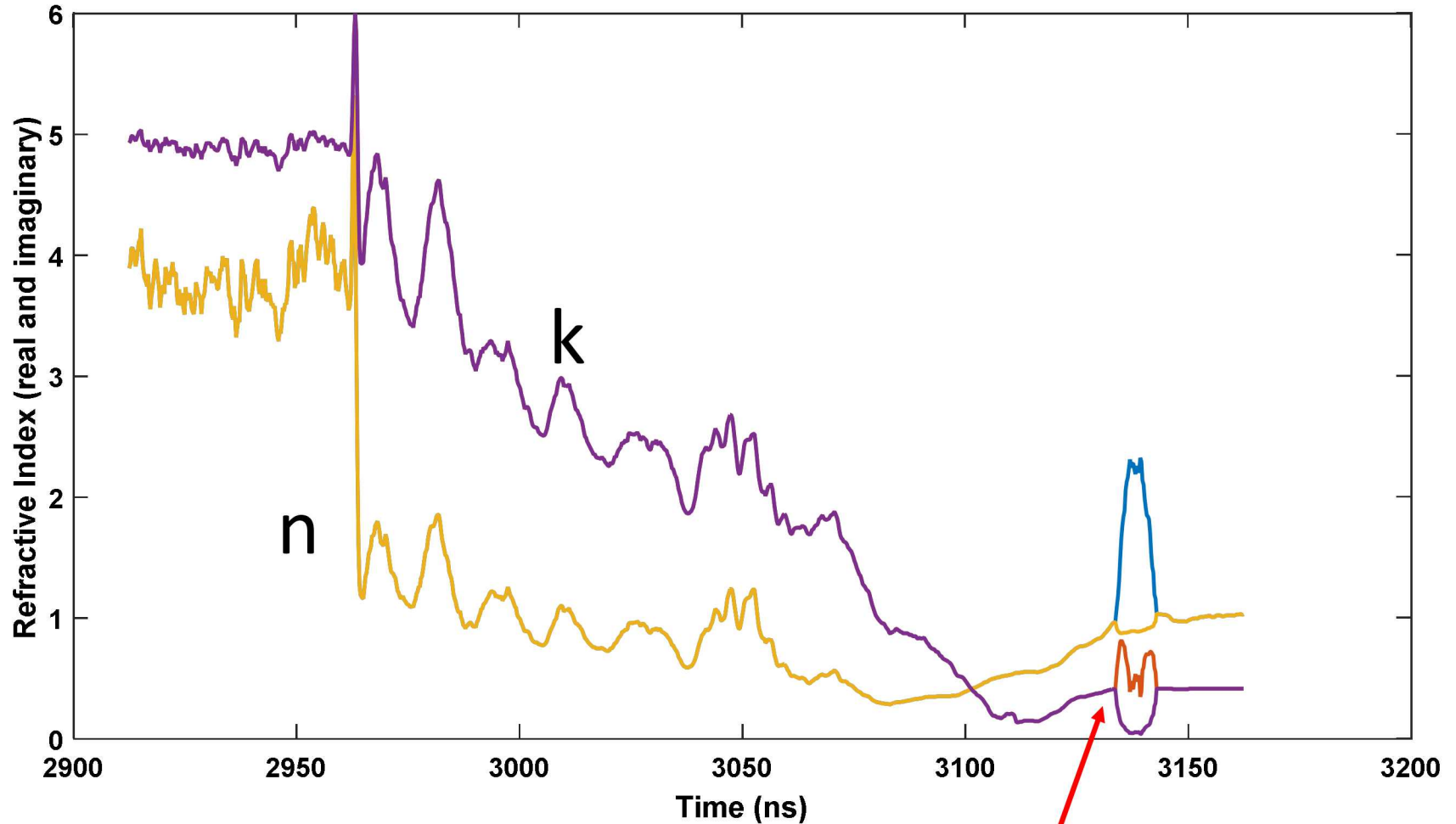
The refractive index solution was put back through my functions to solve for output signal. These match the data over the relevant time range.

Output Reflectivity Validation



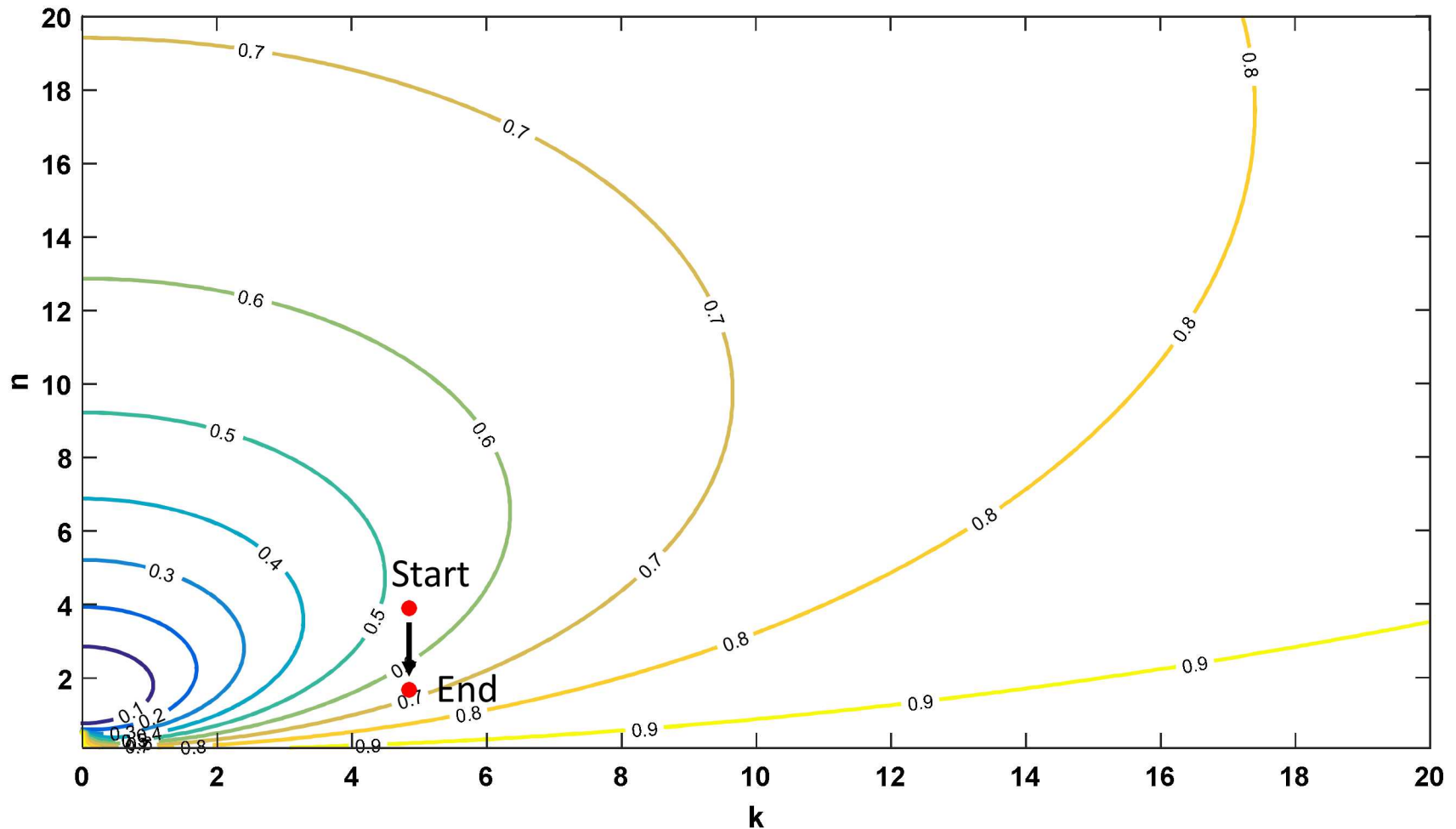
Red is higher because it is only internal to the window, does not have air/LiF interface losses included. This was calculated separately from any functions used in the analysis.

Iterative Guess vs. Constant Guess



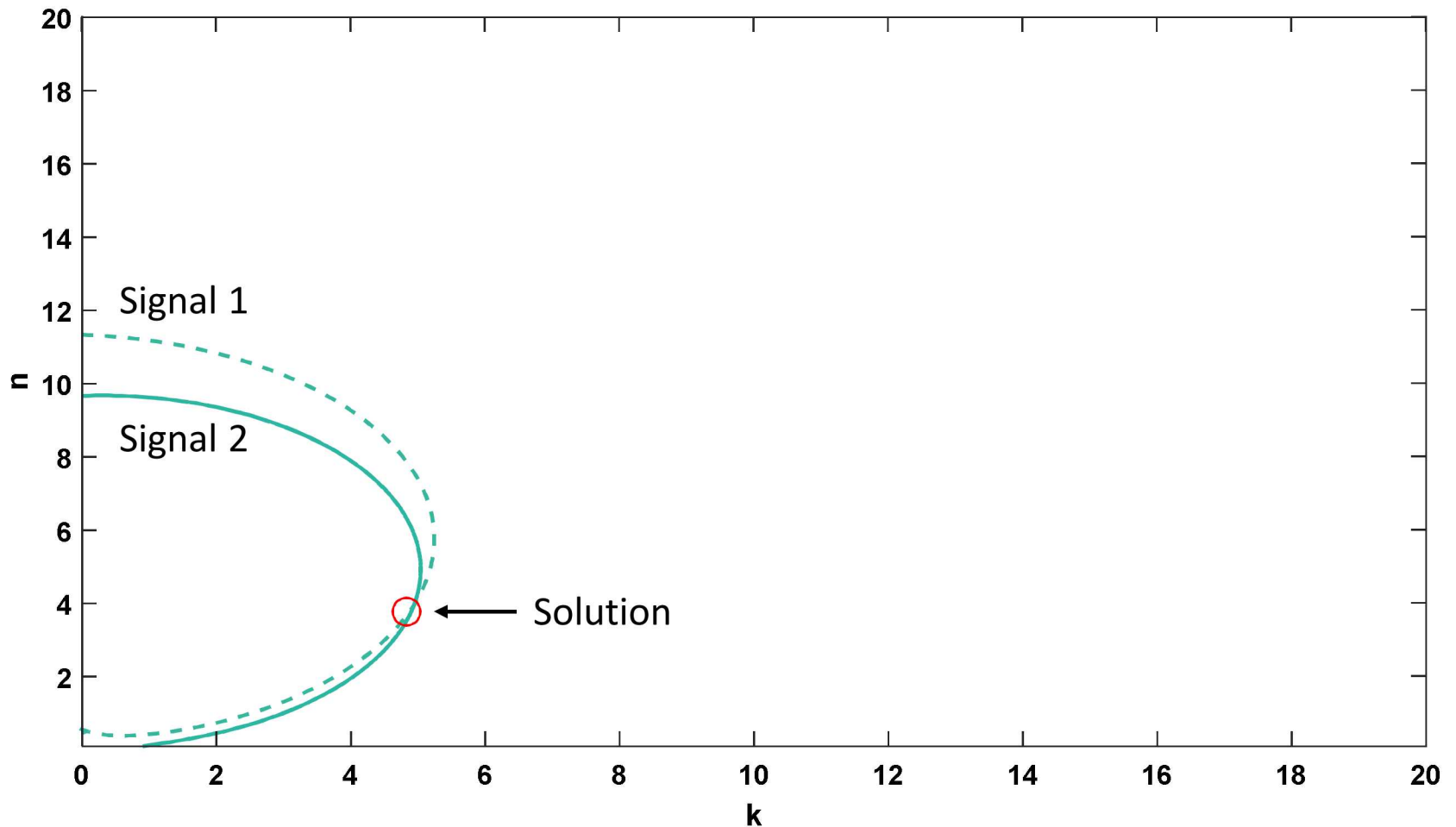
The provided guess to the algorithm was either the solution from the previous time point (iterative) or constant throughout (constant). The two methods only deviate from each other at the extreme, after the signal is very low

Reflectivity Contours

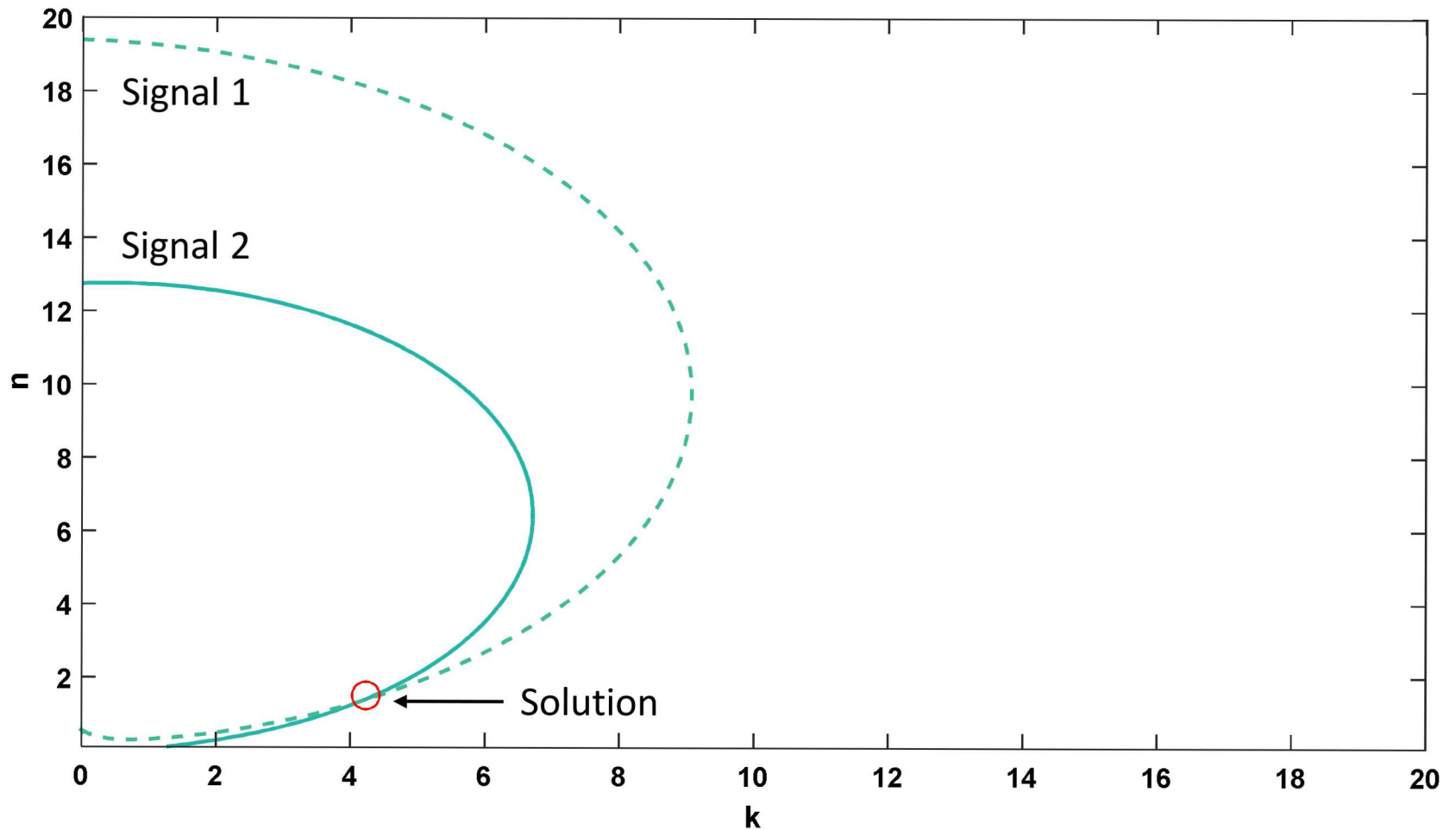


The reflectivity can increase despite decreasing n and k values – especially if n decreases more. (Start and end point illustrated are estimates)

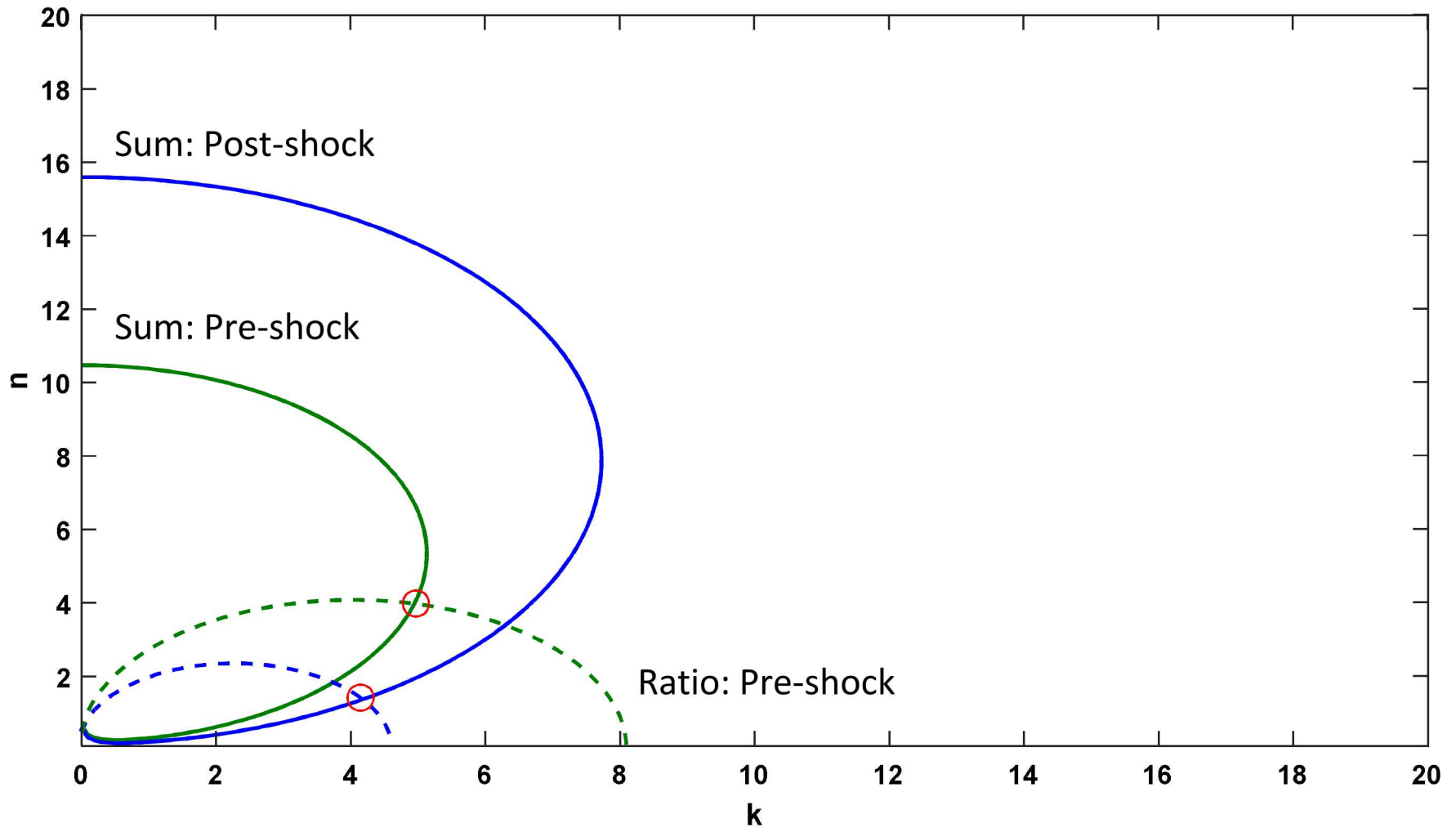
Pre-shock Signal Contours



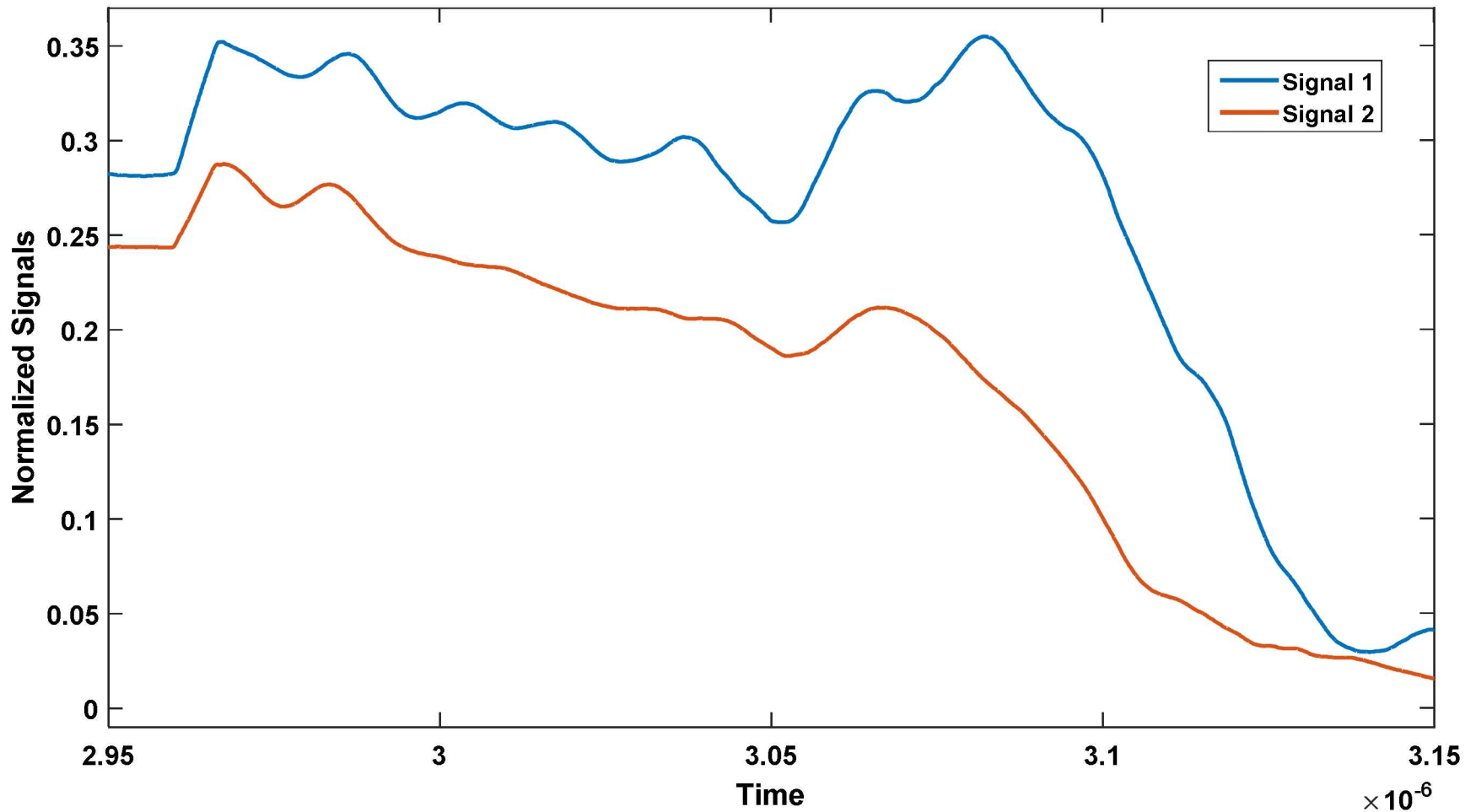
Post-shock Signal Contours



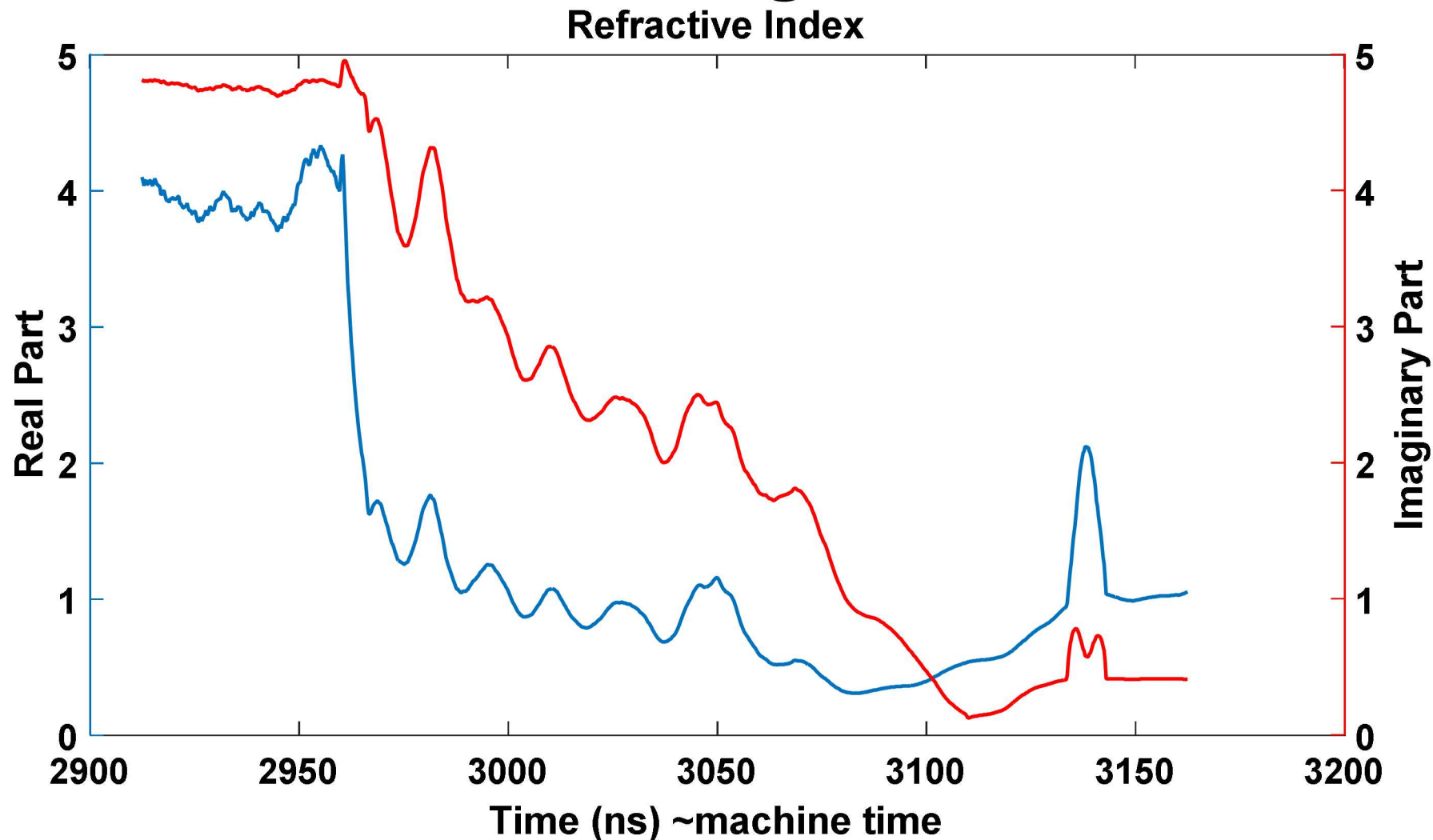
Sum and Ratio Contours



Heavier Smoothing Normalized Data

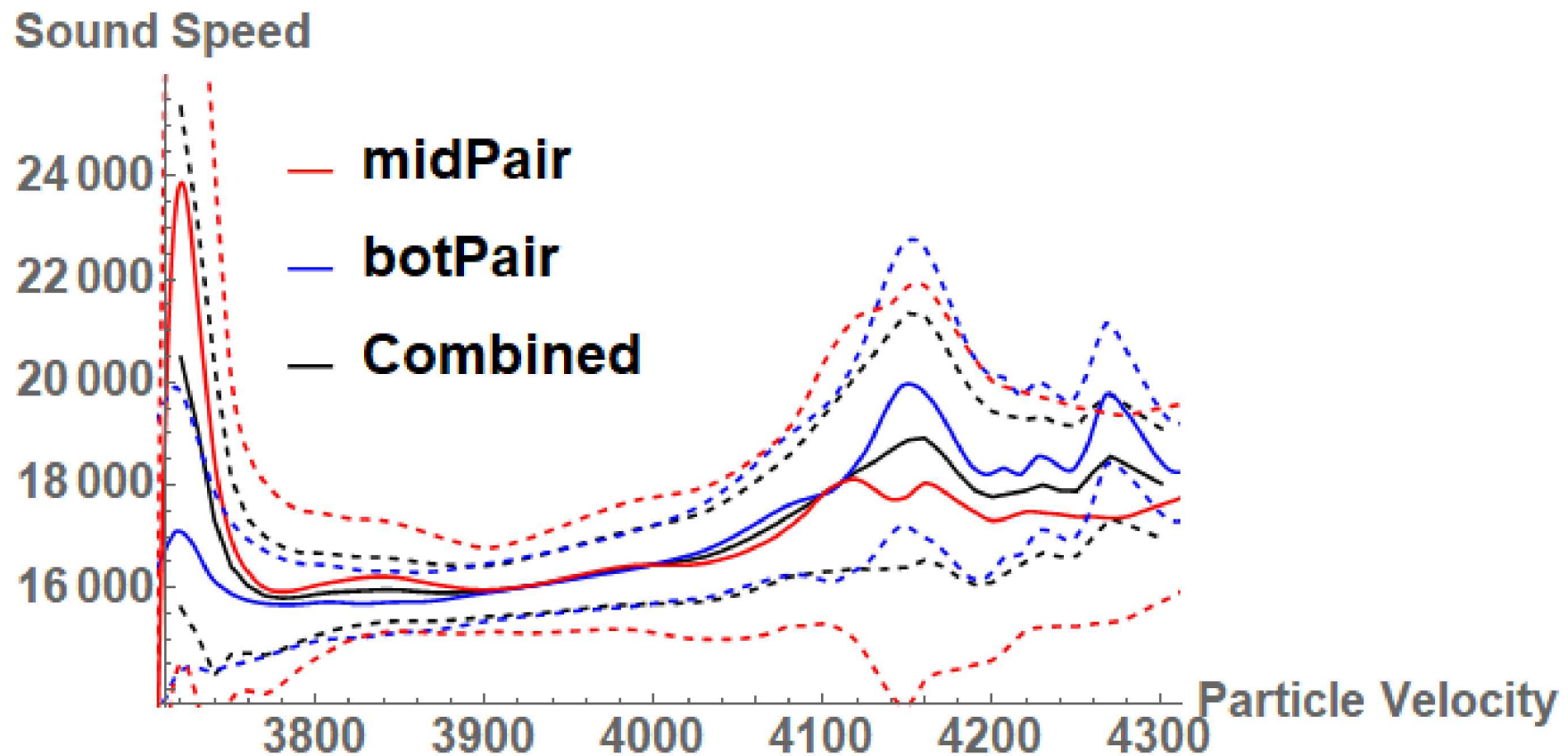


Heavier Smoothing Results

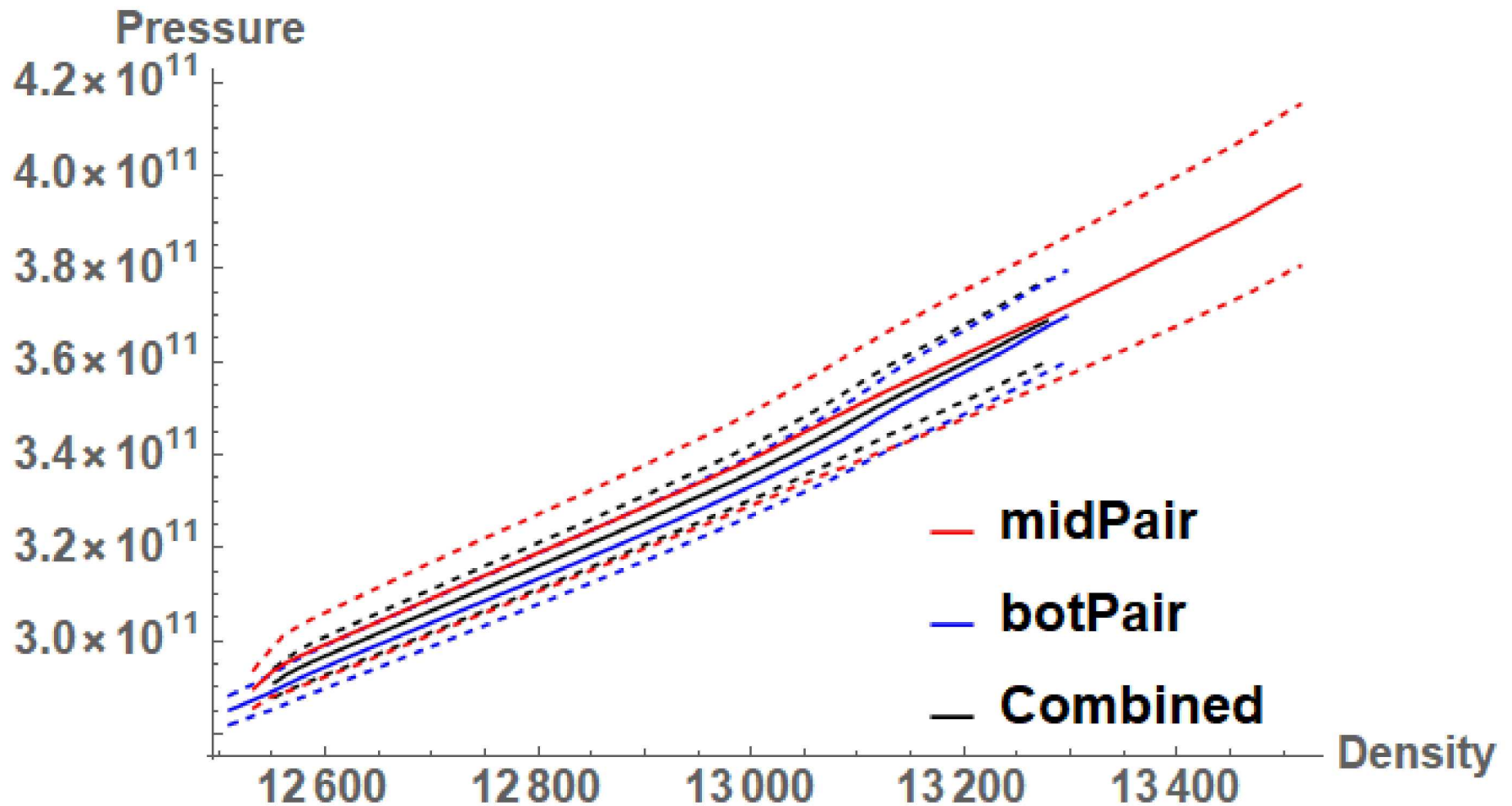


Equation of State

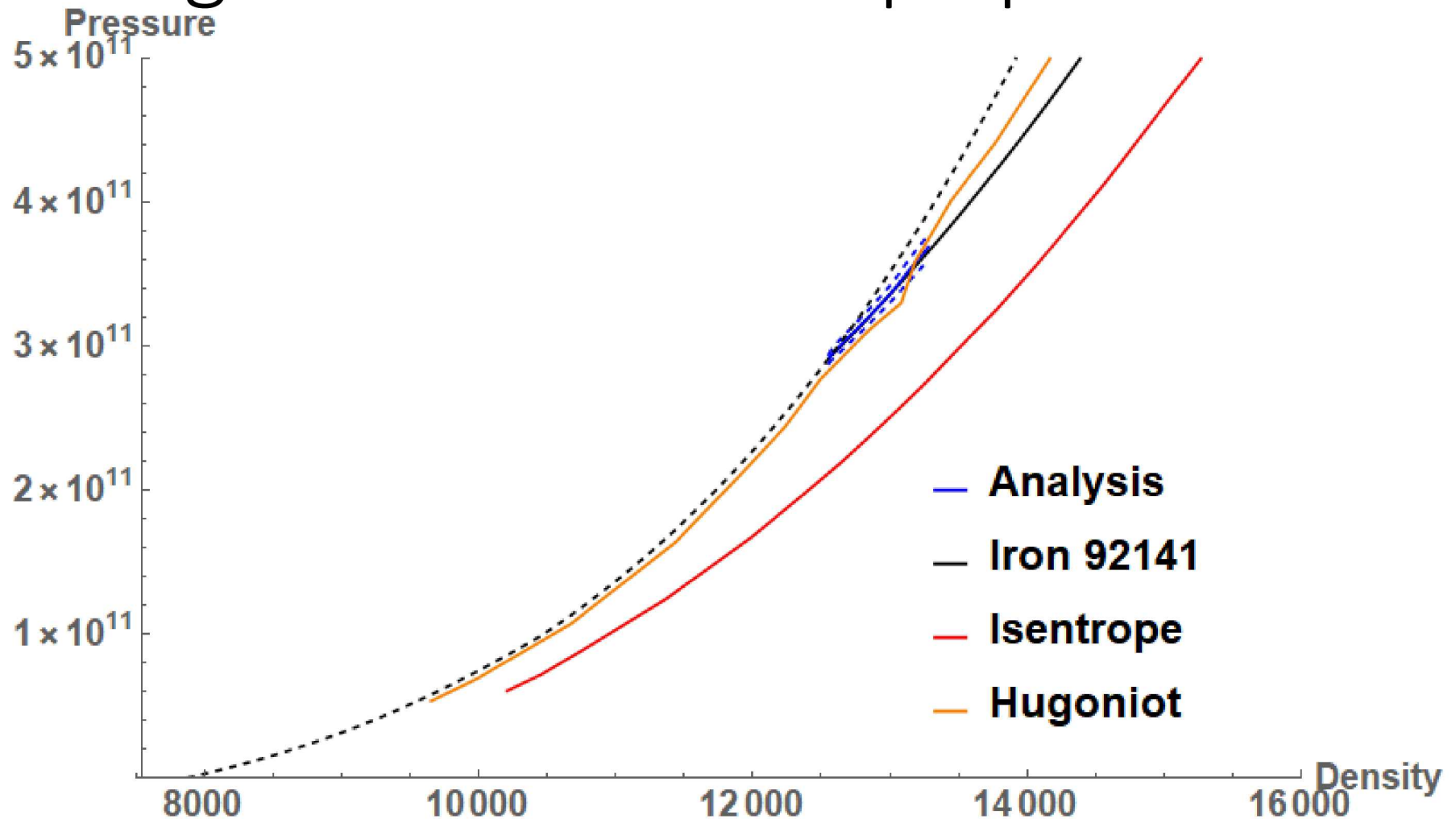
Sound Speed vs. Particle Velocity



Pressure vs. Density

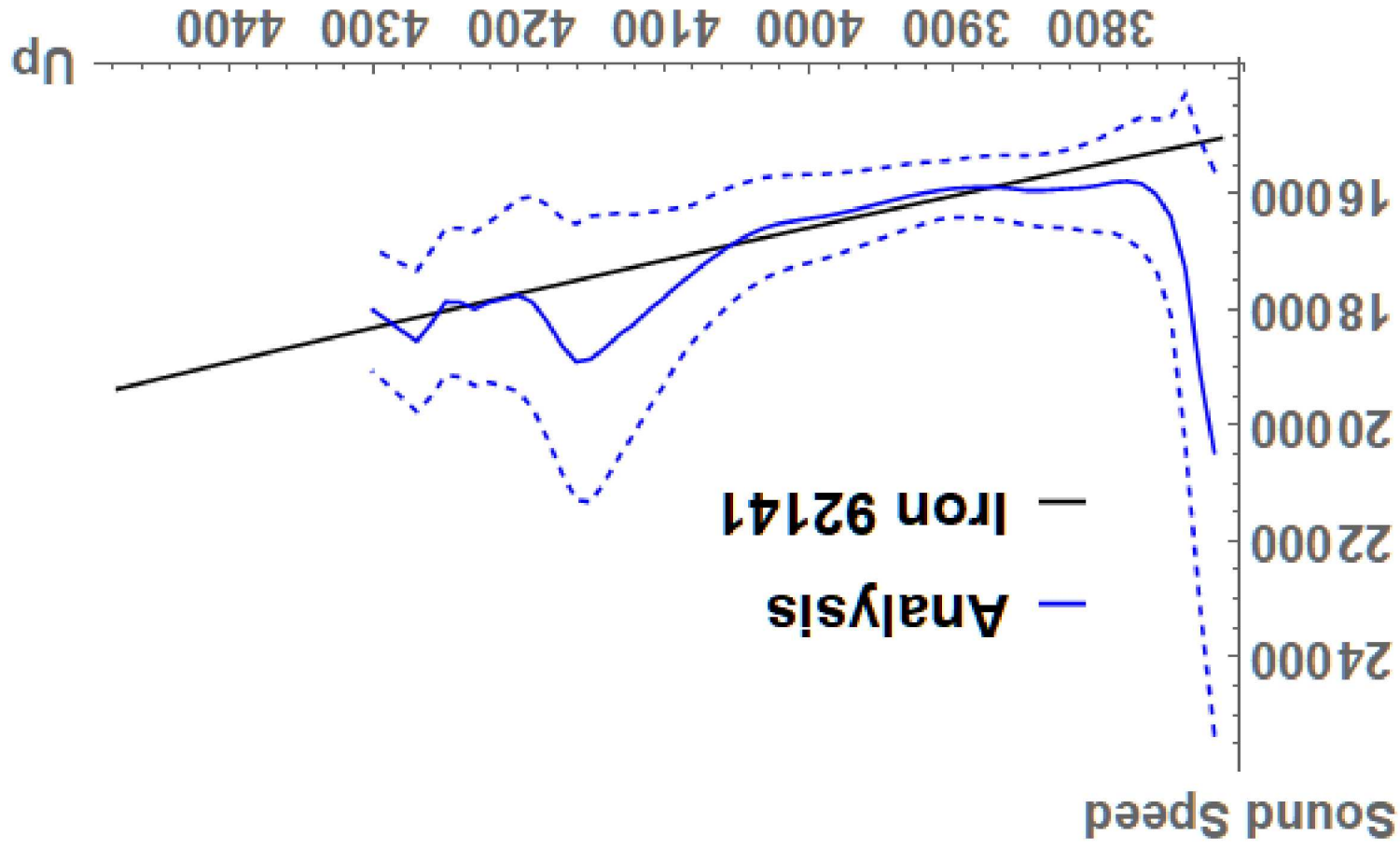


Results compared with standard Hugoniot and Isentrope paths

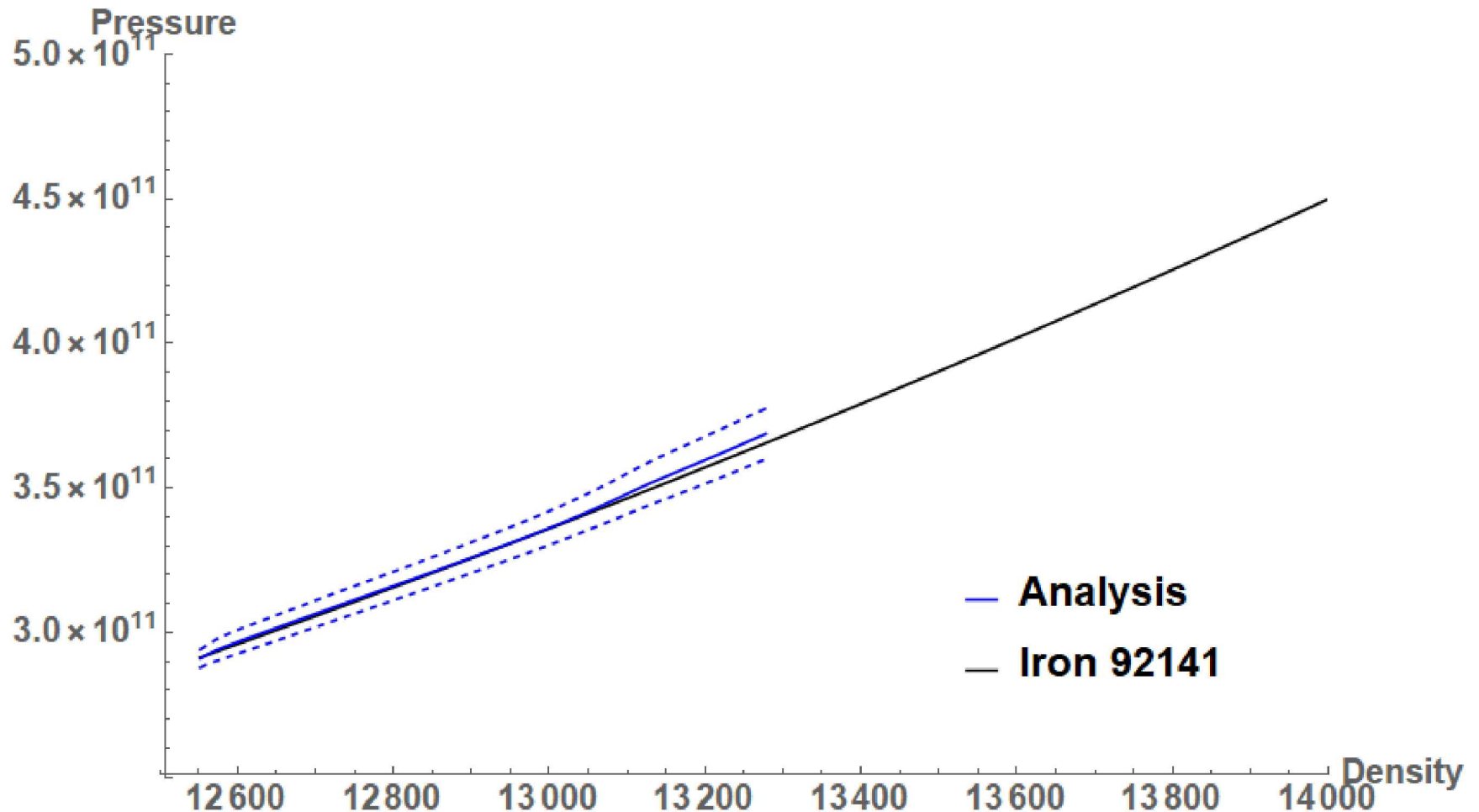


Ping, 2013; Smith, 2018

Direct comparison to EOS table



Direct comparison to EOS table



Produced Velocity Profile

