Lagrange multipliers and the Indian paper PhL 9.20.16

I understand my paper by itself, and I understand Section IV of the Indian paper by itself. Here I want to figure out if there is some connection between them that I am not grokking. Both papers deal with s constraints, and both have s multiplier factors λ_i. Call these papers P and I.

P: I want an extremum of $F(x_1.....x_M)$. If the variables were independent, I would search for points where all M equations $\partial_i F = 0$. But the equations are not independent due to the constraints $f^{(i)} = 0$ for i = 1..s. I construct a new function $H = F + \Sigma_i \lambda_i f^{(i)}$ which has s terms added onto F to make H and the λ_i are unknown constants. Then H is a function of M+s variables. *By fiat* I then set $H_i = 0$ for i = 1 to M+s. What is the justification for doing that? Yes, the last 6 equations replicate the constraints. The first M equations combined are a statement that the rows of the R matrix are linearly dependent. I know that this is associated with a reduced R matrix rank. Then my Theorem 1 says this is a stationary point **r**. So my motivation for setting $H_i = 0$ is that it replicates the constraints AND it creates the condition that the R matrix rows are linearly dependent which I know means that **r** is a stationary point for F(**r**).

Am I somehow claiming that H is a function of M+s *independent* variables? If that were the case, then my conditions $H_i = 0$ would identify a stationary point of the function H. That IS what I am doing (setting all M+s $H_i = 0$) so it is AS IF I were trying to extremize the function H.