Certainly, here are step by step methods to linearize exponential, power law, and other nonlinear models to use first order polynomial least square fit:

1. Linearizing Exponential Models:

Exponential models are nonlinear because they involve a variable raised to a power. To linearize an exponential model, you can take the natural logarithm of both sides of the equation. This transforms the exponential function into a linear function that can be fitted using a first order polynomial least square fit.

For example, consider the exponential model y = ae^(bx). To linearize this model, we take the natural logarithm of both sides:

ln(y) = ln(a) + bx

Now we can fit a first order polynomial to the transformed equation.

2. Linearizing Power Law Models:

Power law models are also nonlinear because they involve a variable raised to a power. To linearize a power law model, you can take the logarithm of both sides of the equation. This transforms the power law function into a linear function that can be fitted using a first order polynomial least square fit.

For example, consider the power law model y = ax^b. To linearize this model, we take the logarithm of both sides:

ln(y) = ln(a) + b ln(x)

Now we can fit a first order polynomial to the transformed equation.

3. Linearizing Other Nonlinear Models:

For other nonlinear models that cannot be linearized using logarithmic or other transformations, a Taylor series expansion can be used to approximate the function locally. In this case, we can approximate the function using a polynomial of degree n at a specific point x0. The function can then be linearized by fitting a first order polynomial to the Taylor series expansion.

For example, consider the function y = sin(x). We can approximate this function using a Taylor series expansion at x0 = 0:

sin(x) ≈ x - x^3/3! + x^5/5! - x^7/7! + ...

Now we can fit a first order polynomial to the Taylor series expansion to linearize the function.

Overall, the general steps for linearizing a nonlinear function involve transforming the function into a linear form using logarithmic or other transformations, or approximating the function using a Taylor series expansion, and then fitting a first order polynomial to the transformed equation.