The main focus of this paper is that in which the nonlinearity does not occur in the non-differentiated form of the equation. An implicit solution of the nonlinear differential equation has been conducted into their development. Boundary layer problems are very closely tied to their applications, and little research concerning several physical theories. They include important nonlinear partial differential equations. Some of these equations could be linearized by some substitution in which the main of the equation the solutions become

\[ y'' + P(x)y = \frac{B(x)}{y} \]

This solution is of course not perfect, it is limited by some of the small interactions of particles with their surroundings to oscillations of a system. This solution is the result of a change of variable and substituting in the solution to the homogeneous equation becomes

\[ y'' + P(x)y = 0 \]

To verify the equation, it shall be analyzed in the same context as E. Pinney [2] that is

\[ y'' + 2\frac{y'}{y} - \frac{3y}{x} = 0 \]

Edmund Pinney showed that is equation has solution in the form

\[ y = [\frac{1}{3} - (x^3 + k^3)^{\frac{1}{3}}] \]

when setting the constant \( w = 1 \) and substituting in the solution to the homogeneous equation the solutions become

\[ y = [\cos(x) + \sin(x)]/(C_1y + C_2y) \quad \text{(Black Line)} \]

\[ y = [\cos(x) + \sin(x)](C_3y + C_4y) \quad \text{(Dotted Line)} \]

Graphically observing the behavior of the right hand sides it can be proven that

\[ \frac{y''}{(y,\dot{y},\ddot{y})} = \text{constant} \]

Thus the results of this paper offers a viable solution to the differential equation; that solution is

\[ x = [\frac{1}{3} - (x^3 + k^3)^{\frac{1}{3}}] \]

This can physically be interpreted as the displacement of the oscillating body. What was considered above was the ideal case where \( k = 0 \); that is to say the oscillator was undamped.

This research paper aimed at providing an alternative to the Reid equation [1] by formulating a more generalized method. Following the Ermakov method to solving a particular form of differential equations a general solution was created.

\[ y'' + 2\frac{y'}{y} - \frac{3y}{x} = 0 \]

This solution is of course not perfect, it is limited by \( m \rightarrow 1 \) a value which does not apply. With further study and research in this field of study new and more generalized equations can be formulated. Further investigation into the special case provided in this paper could result in an equation that could change the way real world problems are approached.

References
