Proof by contradiction

Assume that there exists Elias codewords m and n where and m and is a prefix of n.

Since n is an Elias codeword, it must consist of 0 or more length components, followed by the minimal binary code.

If m is a prefix of n, m must terminate at either:

1. In the middle of a length component
2. At the end of a length component
3. In the middle of the minimal binary code

Case a and b:

Both cases imply that m ends before the minimal binary code. As all Elias codewords must end with the minimal binary code, then by definition m it cannot be an Elias codeword.

Case c:

If m is an Elias codeword and ends in the middle of n's minimal binary code, then it must have some last length component mL1 (the length component which specifies the length of the minimal binary code). Similarly, n has the last length component nL1.

In case c, m is a prefix of n and ends after the start of n's minimal binary code. Consequently, all of n's length components must also be in m. This means that mL1  = nL1. Therefore, it follows that m’s minimal binary code must have the same length as n’s minimal binary code. But this cannot be possible since m terminates before the end of n's codeword. CONTRADICTION!

Thus, in all cases, this assumption leads to a contradiction. Using proof by contraction, no Elias codeword m can be a prefix of another Elias codeword n for .