amc technical briefs

recommendation

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Customising the simple fitness function

There is a simple method of modifying the fitness function to incorporate information about the lowest level of interest and provide suitable u_f-values at any point in the concentration range. Such a level of uncertainty is clearly related to, and somewhat smaller than, any statutory or other decision limit, and its value would have to be determined by the provider of the proficiency scheme. In the hypothetical example above, we might decide that an uncertainty of lower than 0.05 would never be required. This minimal uncertainty u_L could then be combined with the general fitness function $g(c)$ suitable for higher concentrations.

A simple way of doing that is just to use the higher of the two uncertainties, so that we have a fitness function

$$u_f = \max(u_L,\, g(c))\,.$$

Alternatively, combining the terms in the manner normal for independent uncertainties we might use

$$u_f = \sqrt{u_L^2 + g(c)^2}\,.$$

These two customised functions give similar results (Figure 1) and both are dominated by   at high concentrations, and by   at low concentrations.