962-65-1162 **Robert P. Bennell*** (bennellrp@mail.vmi.edu), Department of Mathematics & Computer Science, Virginia Military Institute, Lexington, VA 24450. *An efficient algorithm for smoothing by spline function.*

We consider the classical, noisy data fitting problem: Given n discrete data,

$$y(t_i) = f(t_i) + \epsilon_i \qquad \text{for } i = 1, 2, \ldots, n$$

where $\epsilon_i \sim N(0, \sigma^2)$, find an approximation $f_\lambda(t)$ to $f(t)$ by minimisation of the functional

$$\Phi[h(t), \lambda] = \frac{1}{n} \sum_{i=1}^{n} \left(h(t_i) - y(t_i)\right)^2 + \lambda \int_{t_1}^{t_n} \left[h''(t)\right]^2 \mathrm{d}t \tag{1}$$

amongst all functions $h(t) \epsilon W_2^2[t_1, t_n]$.

It is well known that the extremal function furnishing a minimum of (**??**) is a natural cubic spline having knots at the data abscissae $\{t_i\}$, with prescribed third derivative discontinuities at the interior knots $t_i; i = 2, 3, \ldots, n-1$ and third derivative end-conditions at t_1 and t_n.

We present a novel B-spline algorithm, using Generalised Cross Validation to estimate the optimum value of the smoothing parameter λ, and demonstrate efficiency by comparison to the current alternatives. (Received October 02, 2000)