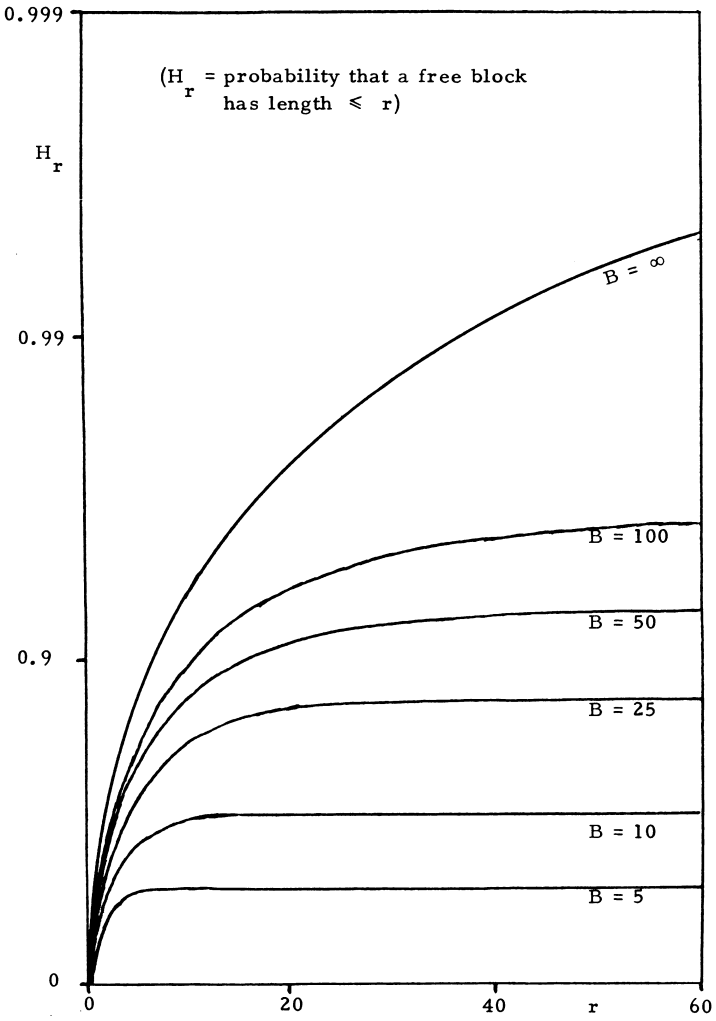

Fig. 10

$\Delta^{-}\tilde{f}$ tend towards equations (3.5, 3.6) of the previous paper in the high utilisation situation. It is an obvious inference that the previous high utilisation model merges with the present low utilisation model at the threshold configuration corresponding to $x = 0{\cdot}5151$. This inference is supported by **Fig. 9**, showing the computed variation of x with B, where B is plotted on a log scale.

The computed H distributions for a range of B values are shown in **Fig. 10**, using as before a logarithmic scale for the H axis. The observed characteristics of the simulation runs are successfully reproduced at low store utilisations.

7.6 Validity of the model

An estimate of the range of θ values over which the low utilisation model is applicable for given N is provided by the hypothesis that the long free block should be at least as great as the total space, λ say, taken up by the B reservations and the $F - 1$ smaller fragments of free store. Now

$$\lambda = B + \sum_r r f_r \tag{7.20}$$

$$= B + F\tilde{\phi}'(1) \tag{7.21}$$

where, by differentiating equation (7.15) by a and then setting $a = 1$,

$$\tilde{\phi}'(1) = \frac{1 - x}{2p_2} \tag{7.22}$$

so that

$$\lambda = \left(\frac{4 + x - x^2}{2x^2}\right)F \tag{7.23}$$

In the limiting case of a large store where, for any given θ, each of N, B and F are large and $x \to 0{\cdot}5151$, it follows that

$$\frac{\lambda}{B} = \frac{4 + x - x^2}{4x} \to 2{\cdot}0624 \tag{7.24}$$

The validity hypothesis corresponds to $\lambda \leqslant \frac{N}{2}$ which requires $\theta \leqslant 0{\cdot}2424$. Thus the tentative expectation would be that the low utilisation model is applicable up to 25% store utilisation. Above 50% utilisation the high utilisation model has been demonstrated. The middle range from 25% to 50% is a transitional region with a considerable variability in behaviour.

As a check on this reasoning, the case $N = 200$ leads to predictions $\lambda = 13{\cdot}96, 51{\cdot}40, 90{\cdot}57$ for $\theta = 0{\cdot}05, 0{\cdot}15, 0{\cdot}25$ and hence to the size of the long free block being 186·04, 148·60, 109·43 respectively. These are verified by the position of the steepest parts of the H curve in Fig. 6(*a*) for $\theta = 0{\cdot}05$ and $\theta = 0{\cdot}15$ at the right hand end where H_r makes its final rise to include the long free block. The case $\theta = 0{\cdot}25$ is seen to lie already within the transitional region.

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Books reviewed in this issue