

DETECTION OF SOLID BURSTS

with any multiplicity

Solid burst with multiplicity

(length l): $e = (0 \dots 0 \underbrace{1 \dots 1}_l 0 \dots 0)$

Let $n = q^r - 1$, α primitive in \mathbb{F}_{q^r}

$$H = [1 \ \alpha \ \alpha^2 \ \dots \ \alpha^{n-1}]$$

(For $q=2$ this is the Hamming code)

This $(q^r - 1, q^{r-r-1})$ q -ary

code detects solid bursts

with any multiplicity $l < n$

Proof

$$S = H e = [1 \alpha \alpha^2 \dots \alpha^{n-1}] \begin{matrix} l \left\{ \begin{matrix} 0 \\ \vdots \\ 0 \\ 1 \\ \vdots \\ 1 \\ 0 \\ \vdots \\ 0 \end{matrix} \right\} \end{matrix} =$$

$$= \alpha^i + \alpha^{i+1} + \dots + \alpha^{i+l-1}$$

$$= \alpha^i (1 + \alpha + \alpha^2 + \dots + \alpha^{l-1}) =$$

$$= \alpha^i \frac{\alpha^{l+1} - 1}{\alpha - 1} \neq 0$$

$$\text{since } l < n = q^r - 1.$$