

$$\begin{array}{ccccccc}
& & ? & \longrightarrow & 0 & & \ker(g^\bullet) \\
& & \downarrow & & \downarrow & & \downarrow \\
& 0 & \longrightarrow & M \otimes I & \xlongequal{\quad} & M \otimes I & \longrightarrow 0 \\
& \downarrow & & \downarrow & & \downarrow & \\
0 & \longrightarrow & M \otimes X & \xrightarrow{\begin{pmatrix} 0 \\ 1 \end{pmatrix}} & M \oplus (M \otimes X) & \xrightarrow{(1,0)} \twoheadrightarrow & M \otimes A \longrightarrow 0 \\
& \parallel & & & \downarrow & & \downarrow \\
& M \otimes X & \longrightarrow & M \otimes Y & \longrightarrow & M \otimes A/I & \longrightarrow 0 \\
& & & \downarrow & & \downarrow & \\
& & & 0 & & 0 & \\
& & & & & & \text{cok}(g^\bullet) \\
& & & & & & \downarrow \\
& & & & & & S^\bullet \\
& & & & & & \downarrow g^\bullet \\
& & & & & & T^\bullet \\
& & & & & & \downarrow \\
& & & & & & \text{cok}(g^\bullet)
\end{array}$$

Commutative diagram showing a complex of modules and maps. The diagram consists of several rows of modules connected by horizontal and vertical arrows. Key features include:

- A top row with a module labeled $?$ mapping to 0 .
- A middle row with $0 \longrightarrow M \otimes X \xrightarrow{\begin{pmatrix} 0 \\ 1 \end{pmatrix}} M \oplus (M \otimes X) \xrightarrow{(1,0)} \twoheadrightarrow M \otimes A \longrightarrow 0$.
- A bottom row with $M \otimes X \longrightarrow M \otimes Y \longrightarrow M \otimes A/I \longrightarrow 0$.
- Vertical maps connecting these rows, including an isomorphism $M \otimes X \cong M \otimes Y$ and a map $M \otimes A \twoheadrightarrow M \otimes A/I$.
- A separate sequence on the right: $\ker(g^\bullet) \longrightarrow S^\bullet \xrightarrow{g^\bullet} T^\bullet \longrightarrow \text{cok}(g^\bullet)$.