

$$X^- = x^- + l_s^2 p^- \tau + i l_s \sum_{n \neq 0} \frac{1}{n} \alpha_n^- e^{-in\tau} \cos n\sigma$$

$$X^i = x^i + l_s^2 p^- \tau + i l_s \sum_{n \neq 0} \frac{1}{n} \alpha_n^i e^{-in\tau} \cos n\sigma$$