

Problem 1.10. *Writing the wave operator in four real variables as*

$$\square = \left[\frac{\partial^2}{\partial t^2} - \left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2} \right) \right] \mathbb{I}_{2 \times 2},$$

find four elements $A, B, C, D \in \mathbb{K}$ defined in Problem 1.4, so that

$$\square = \left(\frac{\partial}{\partial t} A + \frac{\partial}{\partial x} B + \frac{\partial}{\partial y} C + \frac{\partial}{\partial z} D \right)^2$$

1

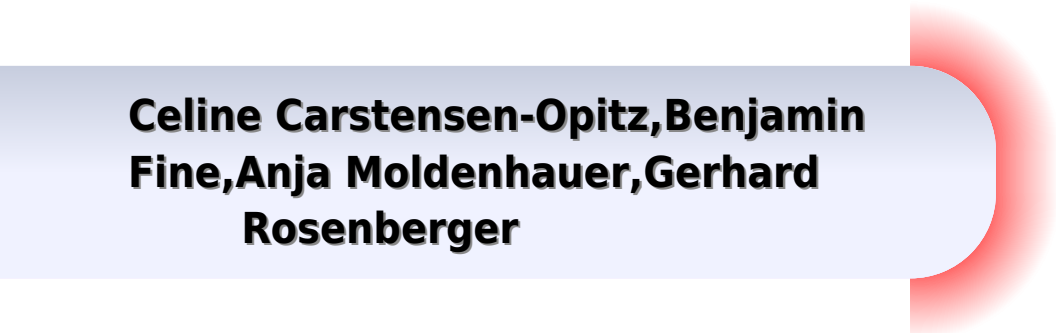
Problem 1.4. *Prove that the quaternions*

$$\mathbb{K} \equiv \{x \cdot 1 + y \cdot i + z \cdot j + w \cdot k | x, y, z, w \in \mathbb{R}\}$$

form a skew field, with the usual vector addition and multiplication defined by $i^2 = j^2 = k^2 = -1$, $ij = -ji = k$, $jk = -kj = i$, $ki = -ik = j$.

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**Celine Carstensen-Opitz, Benjamin
Fine, Anja Moldenhauer, Gerhard
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