

Systems of Ordinary Differential Equations > Linear Systems of Three and More Equations

5.
$$x'_t = h(t)y - g(t)z$$
, $y'_t = f(t)z - h(t)x$, $z'_t = g(t)x - f(t)y$.

1°. First integral:

$$x^2 + y^2 + z^2 = C^2,$$

where ${\cal C}$ is an arbitrary constant.

2°. The system in question can be reduced to a Riccati equation.

Reference

Kamke, E., Differentialgleichungen: Lösungsmethoden und Lösungen, I, Gewöhnliche Differentialgleichungen, B. G. Teubner, Leipzig, 1977.

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http://eqworld.ipmnet.ru/en/solutions/sysode/sode0205.pdf