

MOTI COMPRESSIBILI CON ATTRITO

Le ipotesi alla base del *moto alla Fanno* sono le seguenti:

- il moto è *quasi-unidimensionale* e *quasi-stazionario*;
- l'*area* della sezione di passaggio del condotto è *costante*;
- *il fluido non scambia né lavoro né calore* con l'ambiente, cioè il moto è considerato *omoenergetico*;
- gli *effetti delle forze gravitazionali sono trascurabili*;
- le condizioni termofluidodinamiche del fluido cambiano per effetto degli *sforzi viscosi* alla parete (che costituiscono la *forza spingente*).

MOTI COMPRESSIBILI E SCAMBIO TERMICO

Modello di *moto alla Rayleigh* basato sulle seguenti ipotesi:

- il moto è *quasi-unidimensionale* e *quasi-stazionario*;
- *l'area della sezione di passaggio del fluido nel condotto è ritenuta costante*;
- *il fluido non scambia lavoro con l'ambiente e sia gli effetti viscosi, che quelli delle forze gravitazionali, sono trascurabili*;
- *la produzione di entropia è trascurabile*, in altre parole la trasformazione termofluidodinamica è considerata *reversibile*;
- l'unica *forza spingente* è lo *scambio di calore* lungo il condotto che dà luogo ad una variazione dell'entalpia totale H .

FANNO

Gino Girolamo Fanno (28
November 1888 - 1960)



Fig. 1.10: The photo of Gino Fanno approximately in 1950

RAYLEIGH

John William Strutt, 3rd Baron Rayleigh
(12 November 1842 – 30 June 1919)



FANNO

$$\frac{dG}{G} = \frac{d\rho}{\rho} + \frac{dV}{V} = 0$$

$$dI = dp + \rho V dV = -4f \frac{1}{2} \rho V^2 \frac{dx}{D_e}$$

$$dH = dh + V dV = 0$$

$$G = \rho V = \text{const}$$

$$H = h + V^2/2 = \text{const}$$

RAYLEIGH

$$\frac{dG}{G} = \frac{d\rho}{\rho} + \frac{dV}{V} = 0$$

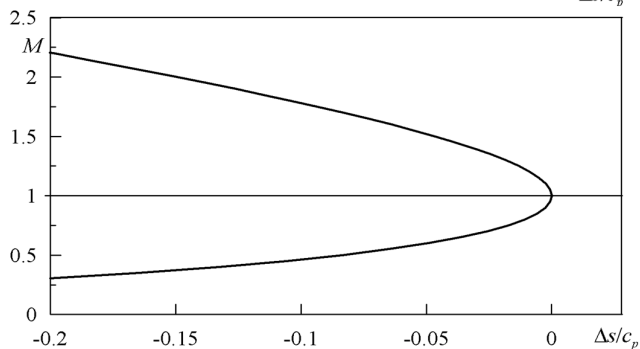
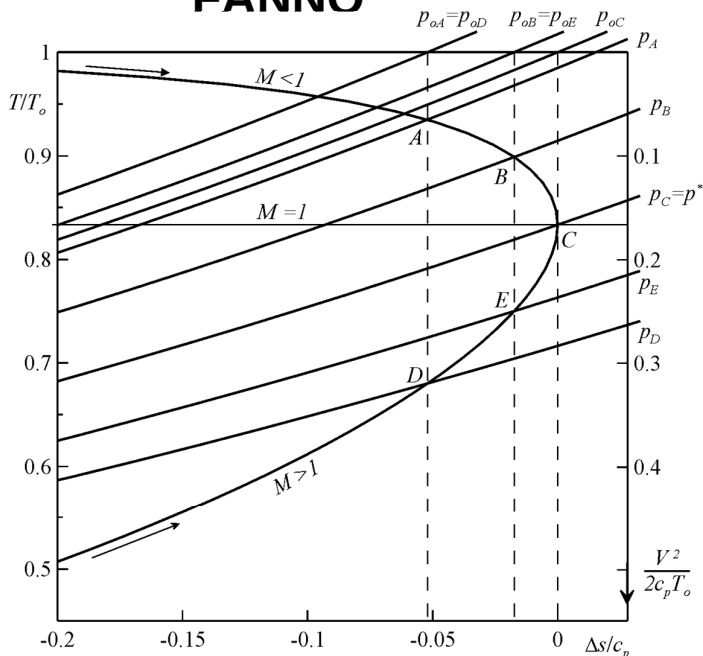
$$dI = dp + \rho V dV = dp + G dV = 0$$

$$G(dh + V dV) = G dH = G c_p dT_o = 4\dot{q} \frac{dx}{D_e}$$

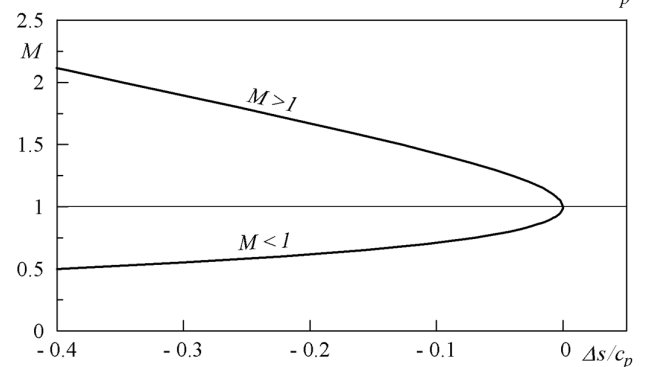
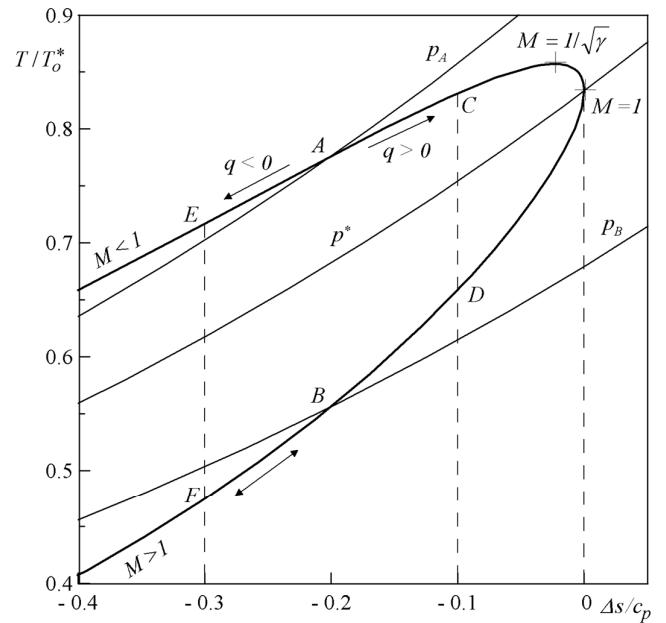
$$G = \rho V = \text{const}$$

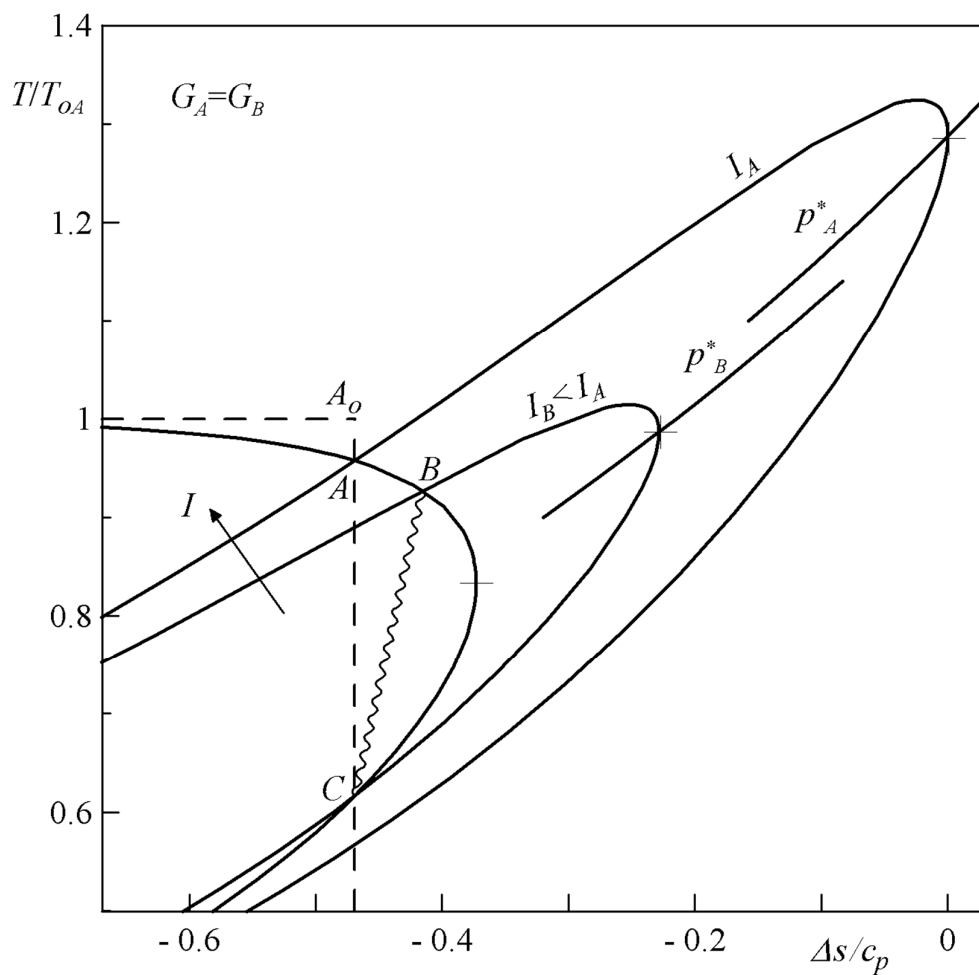
$$I = p + \rho V^2 = \text{const}$$

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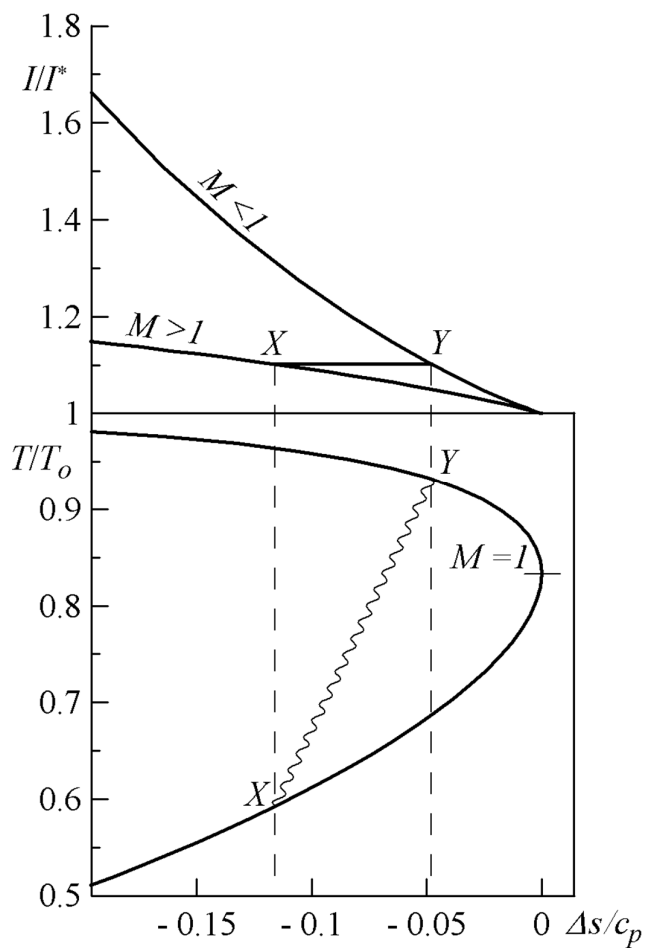


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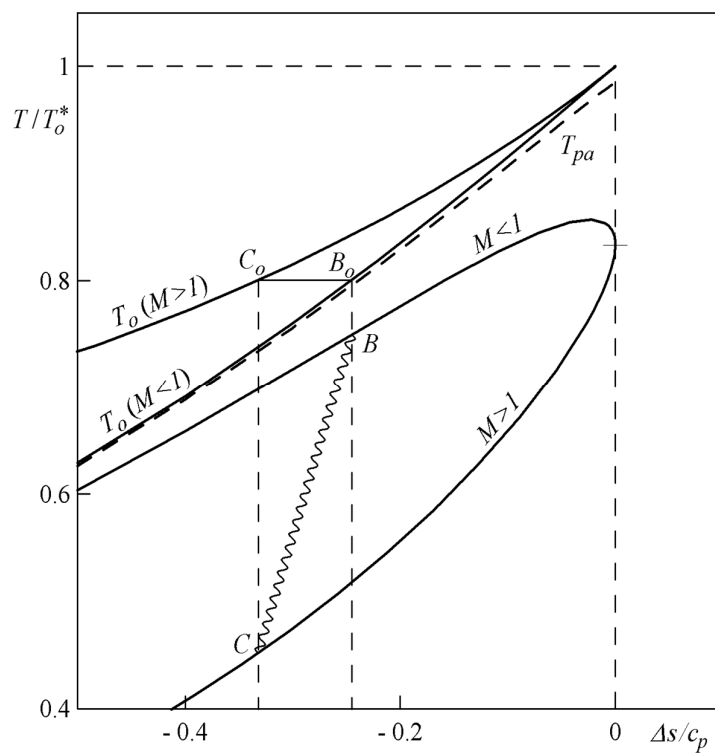




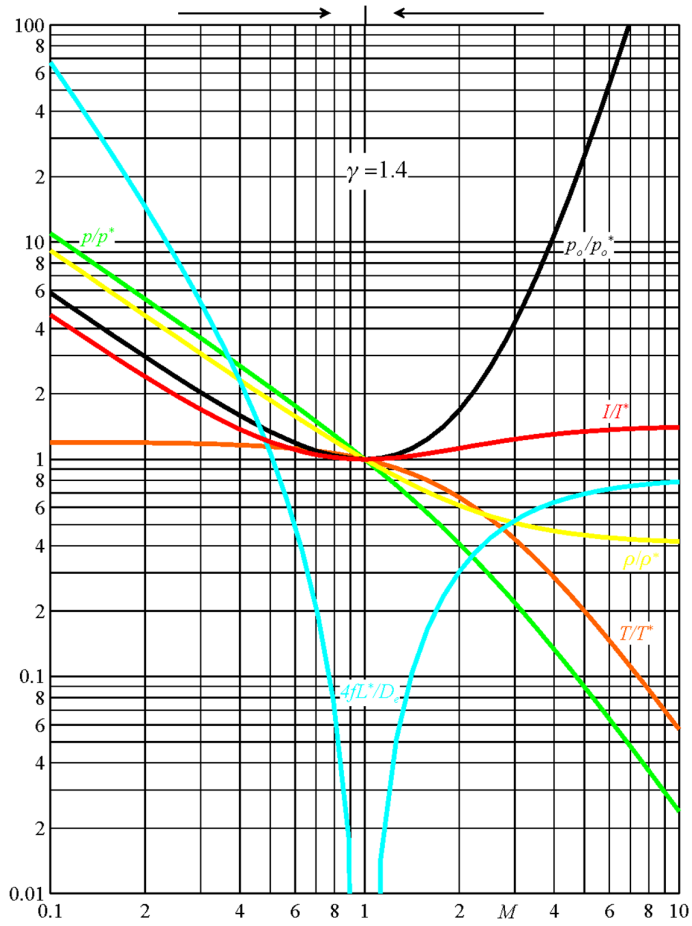
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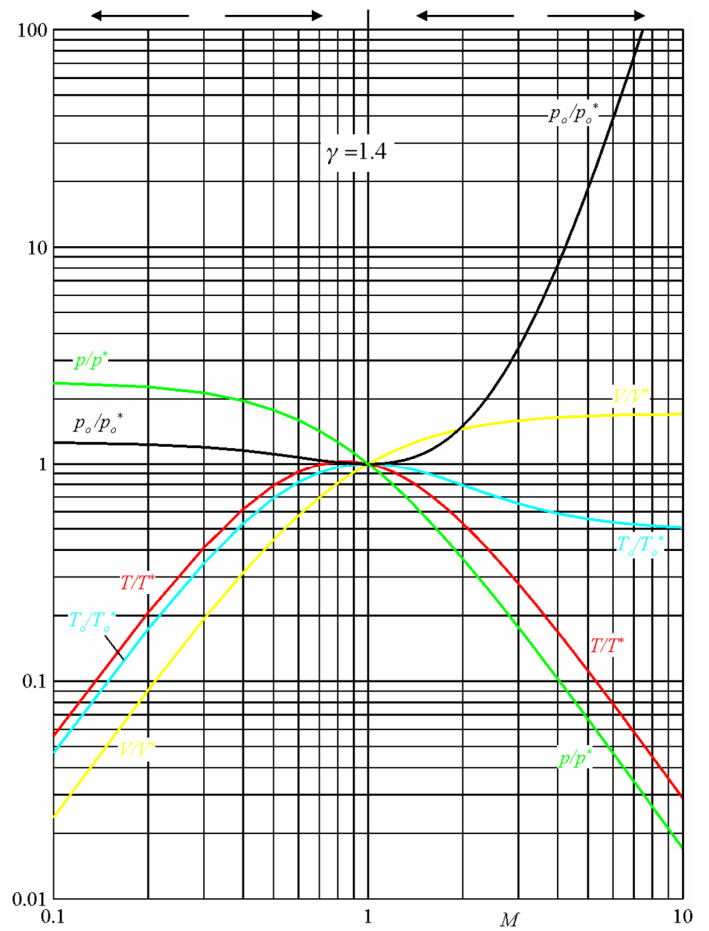
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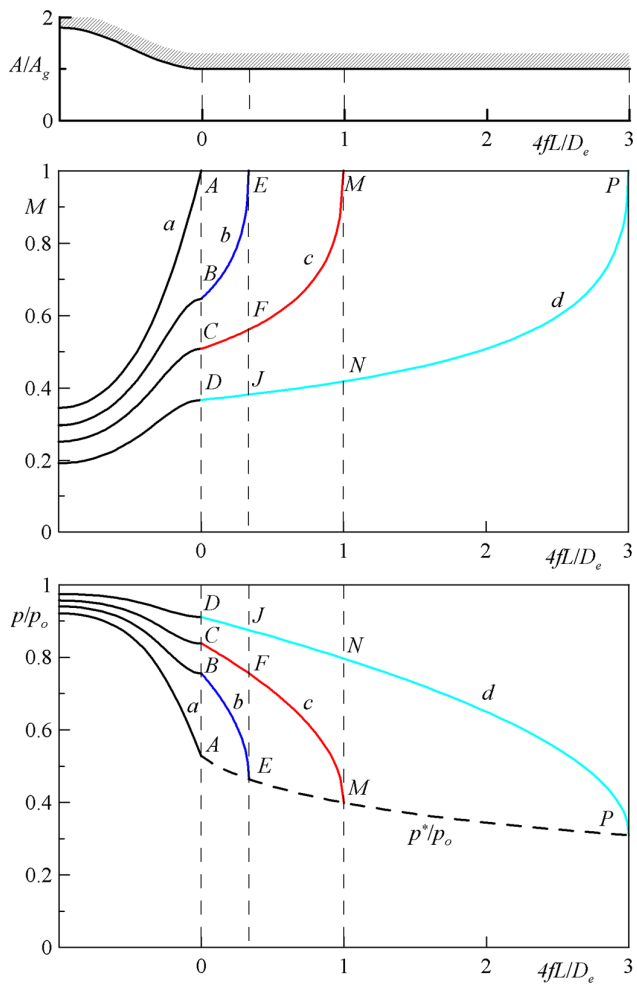
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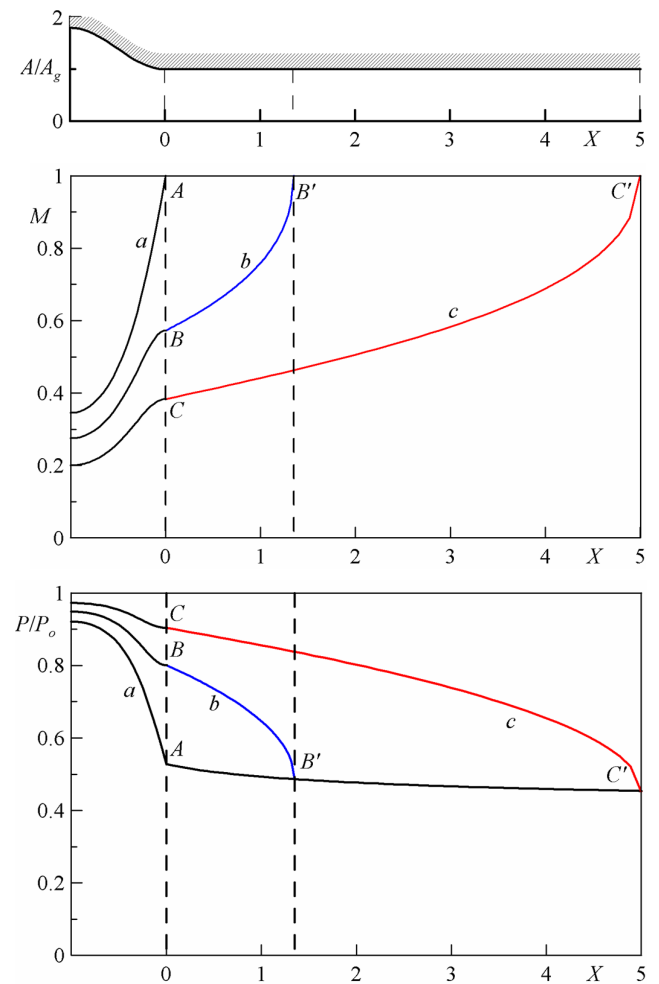
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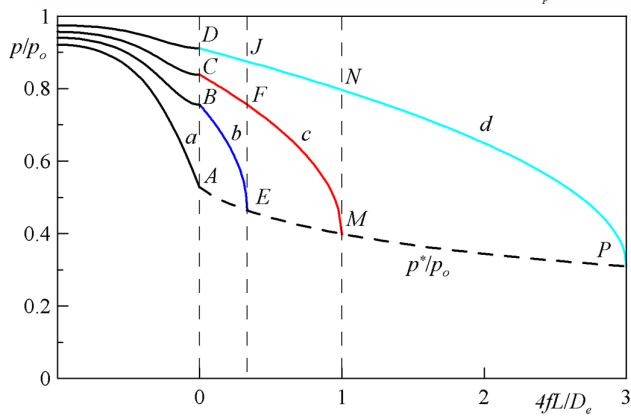
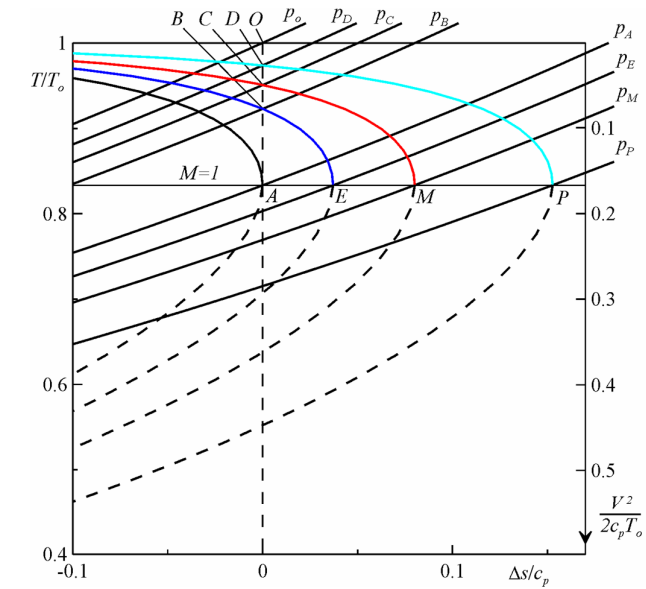
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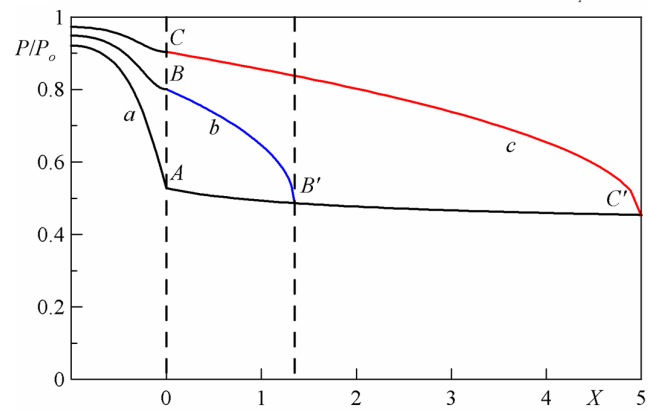
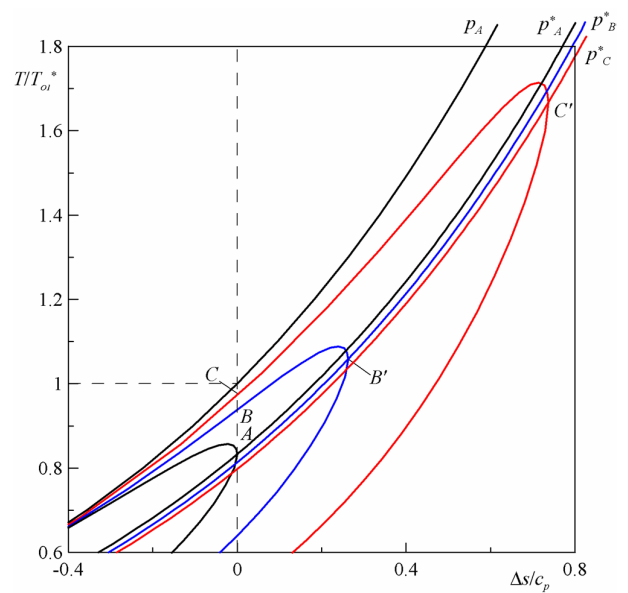
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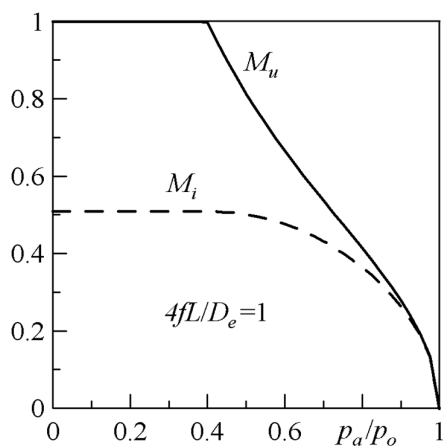
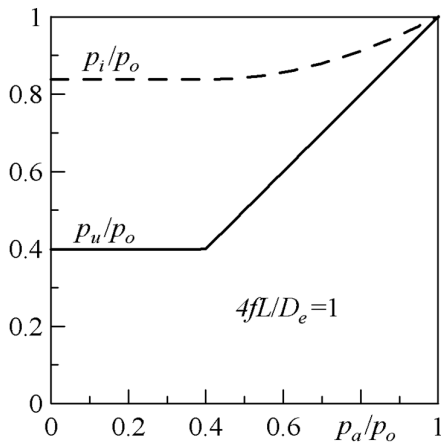
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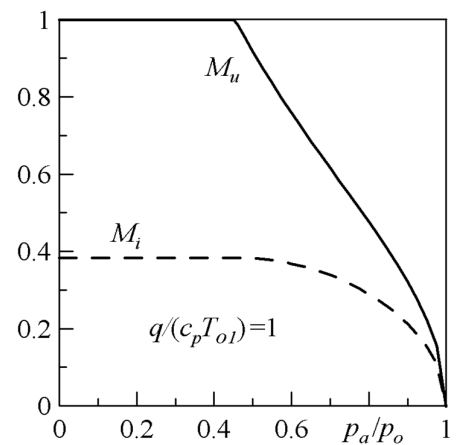
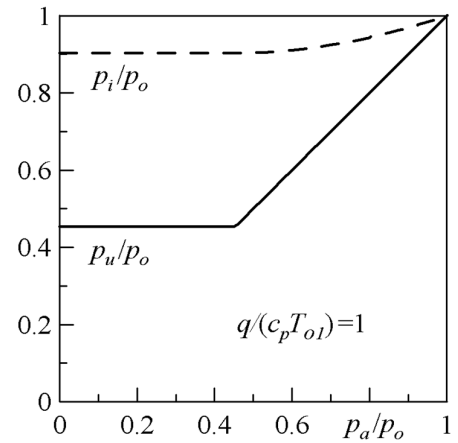
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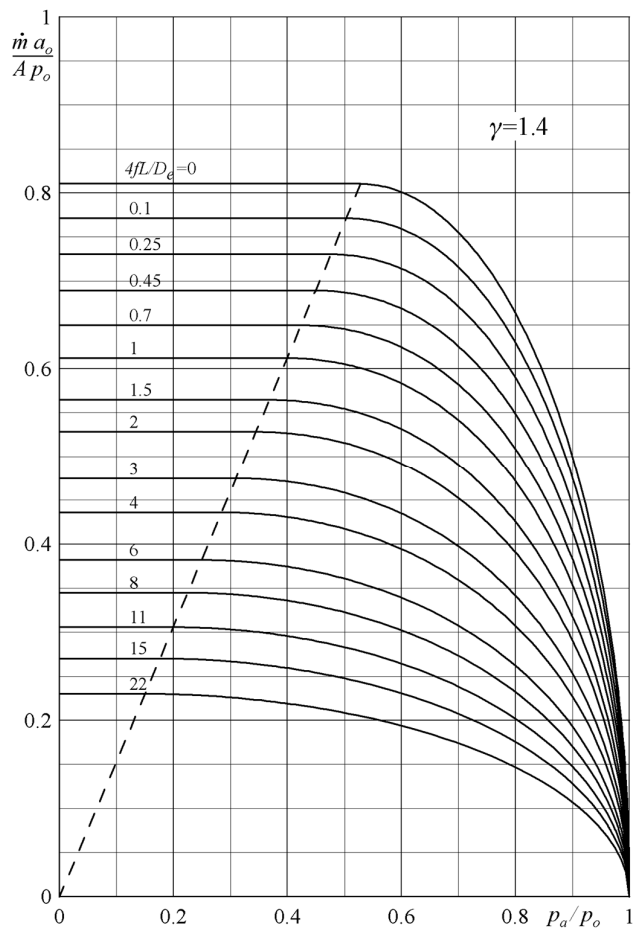
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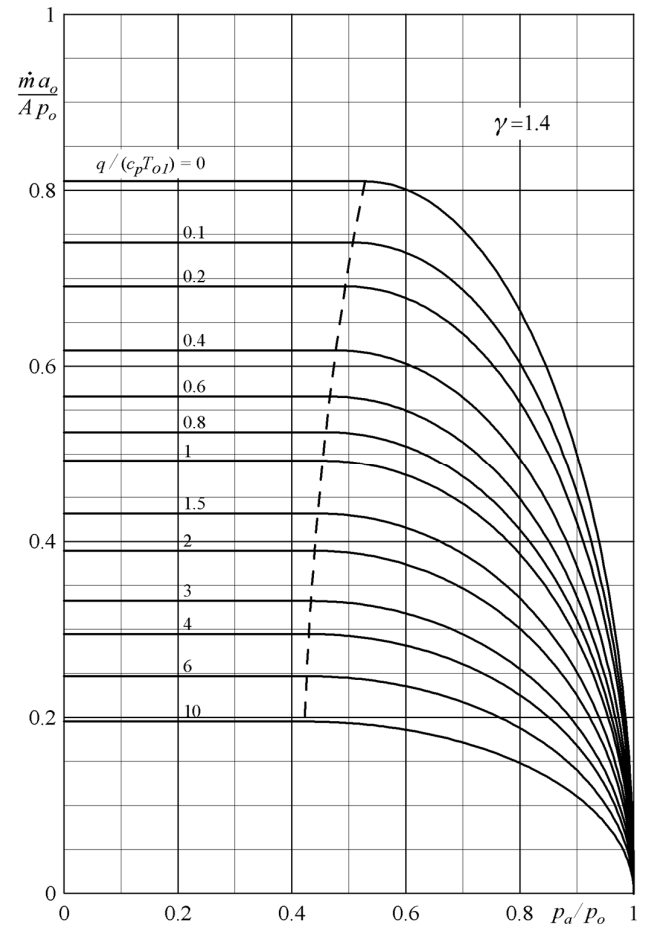
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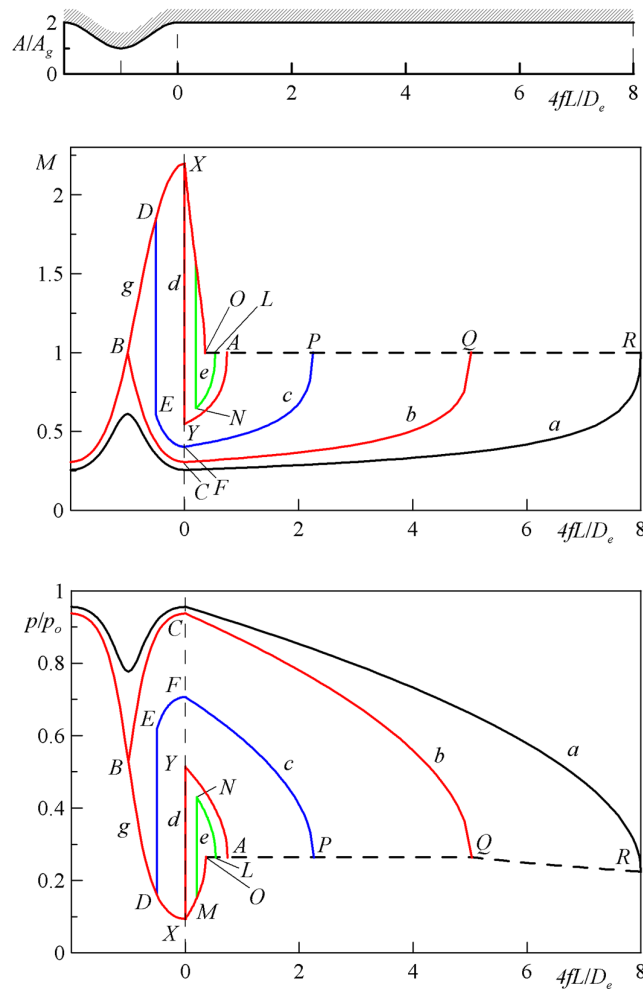
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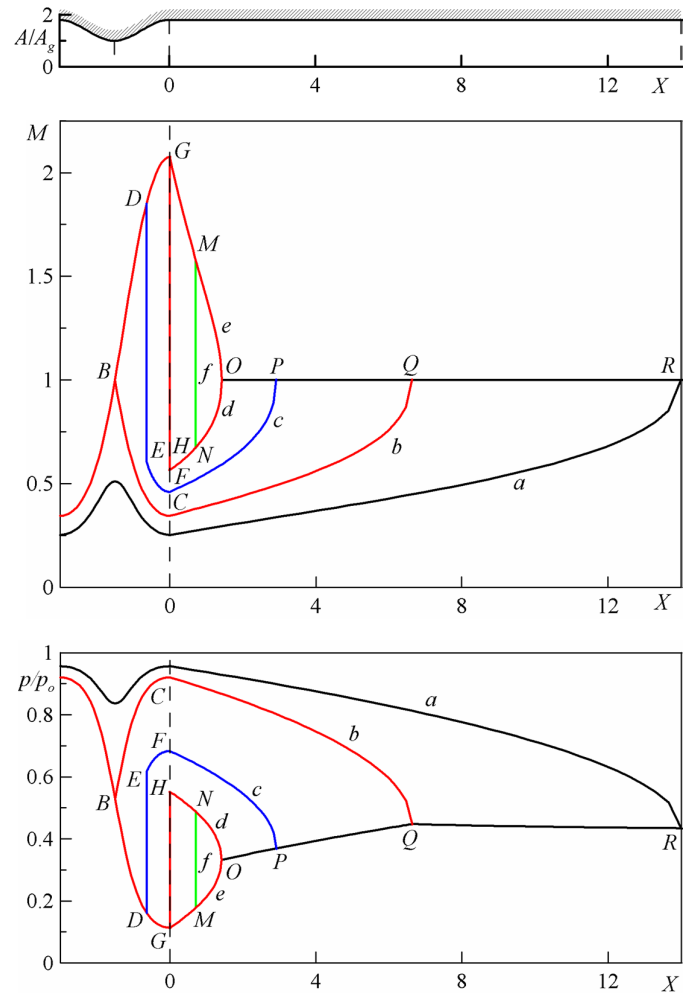
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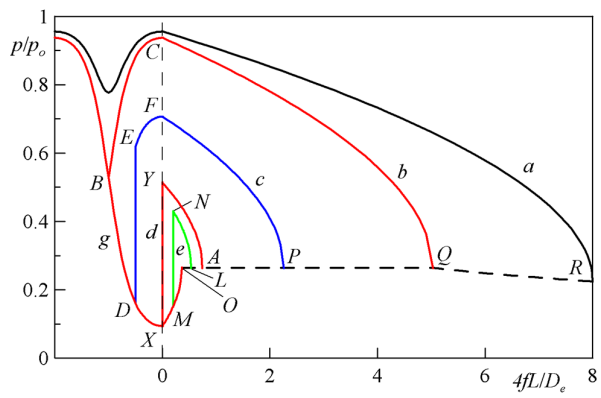
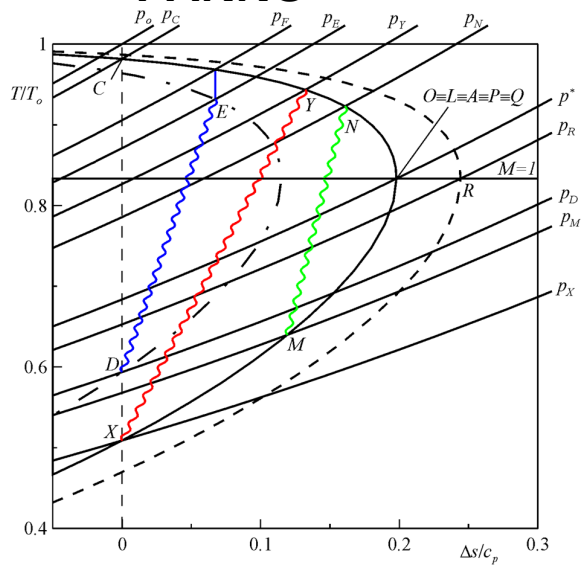
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