



# The problem of classification of two-phase alloy microstructure by means of automatic education

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A.S. Shundeev

Institute of Mechanics, MSU

shundeev@msu.ru

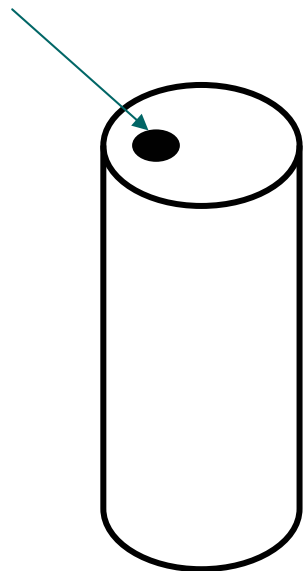
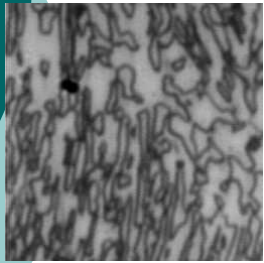
K.A. Kostyukhin

Scientific Research Institute of System Studies, RAS

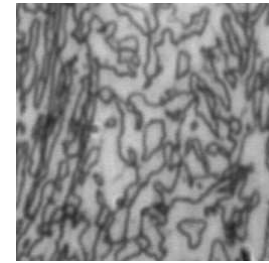
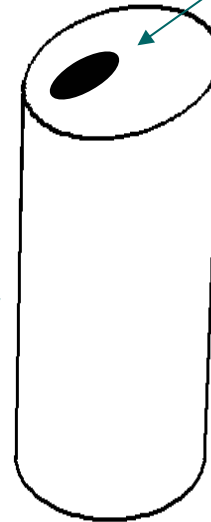
kost@niisi.msk.ru

# Thermal-mechanical effect and microstructure evolution

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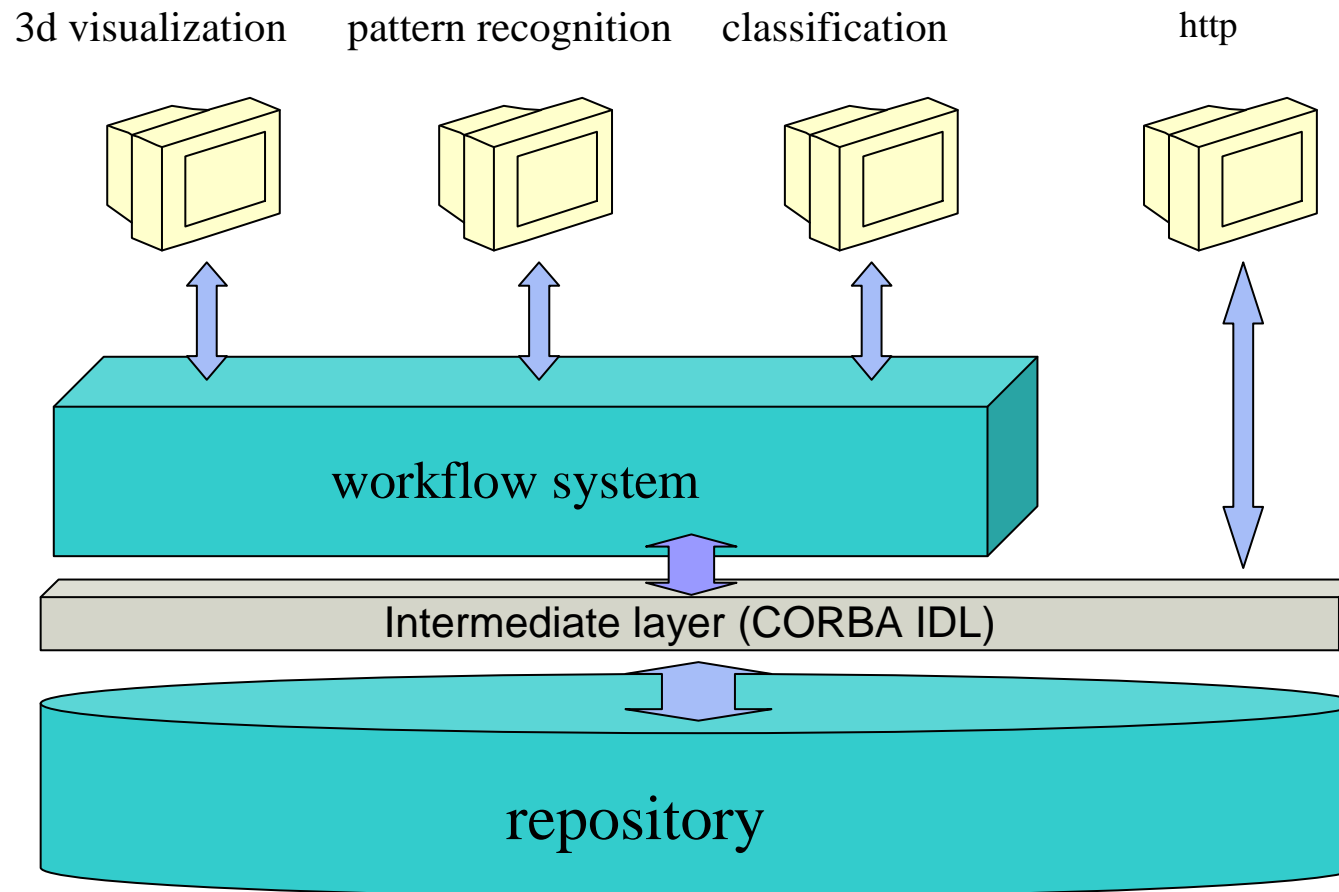
deformation trajectory  
(by Il'ushin)



80 main microstructure classes

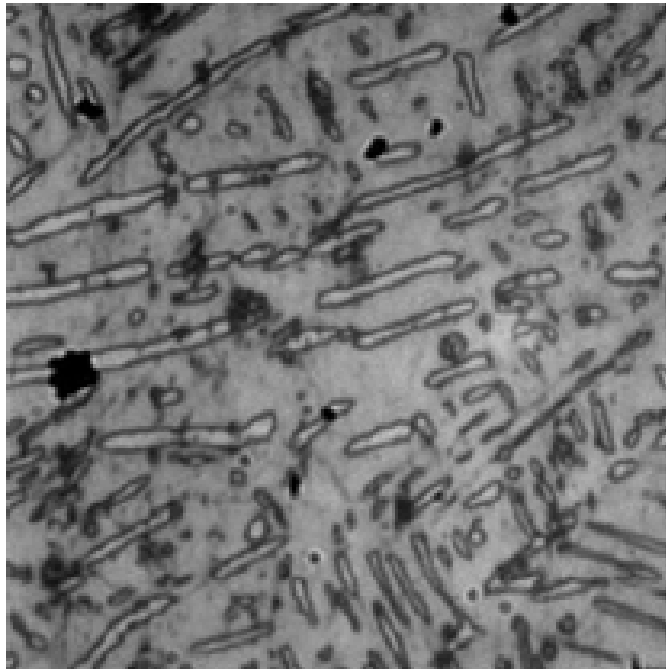
6400 experiment series

# Information and expert system



# Microsection image

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- 1) noise removal
- 2) pattern recognition
- 3) approximation

# Ellipse approximation

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Primary data:

scalar:

$S_{\alpha}$

$S_{\beta}$

functional:

$(x, y),$

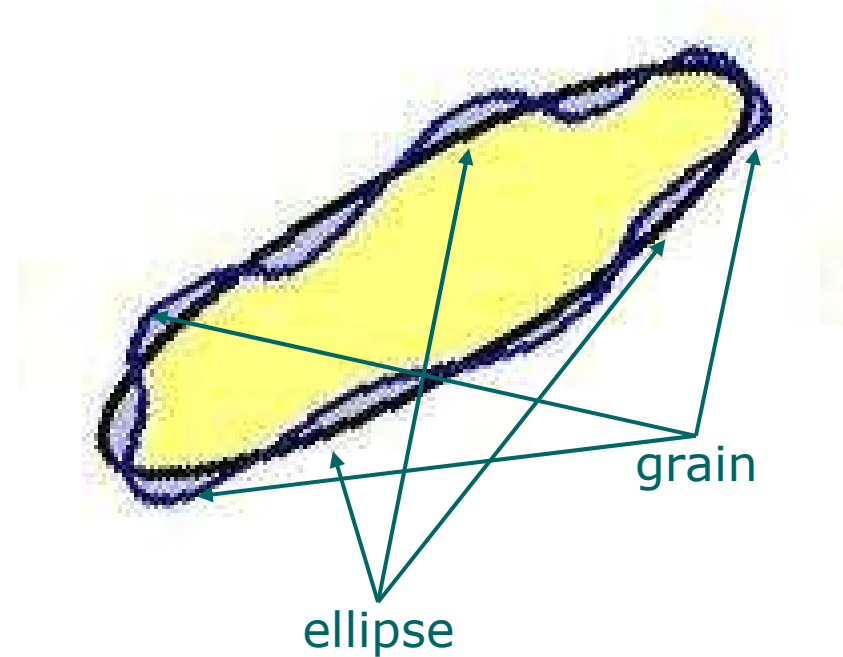
$a,$

$b,$

$\varphi,$

$L_g,$

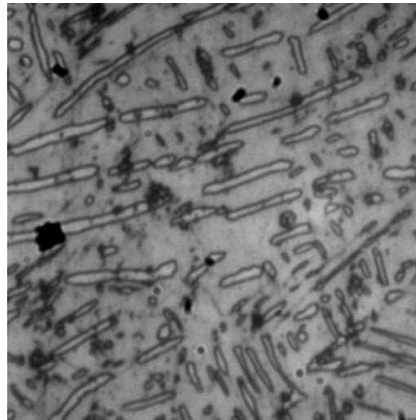
$S_g$



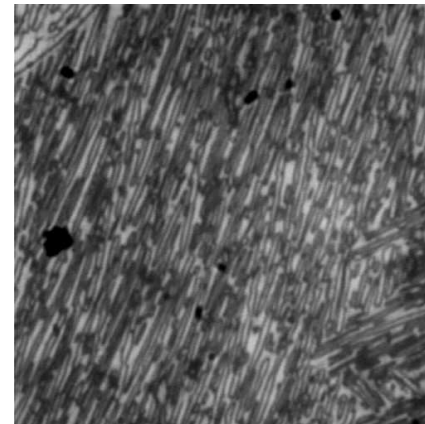
# The problem of classification

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- 1) inductive education  
(by positive and negative examples);
- 2) selection of secondary data types  
(by learning and test samples).



globular

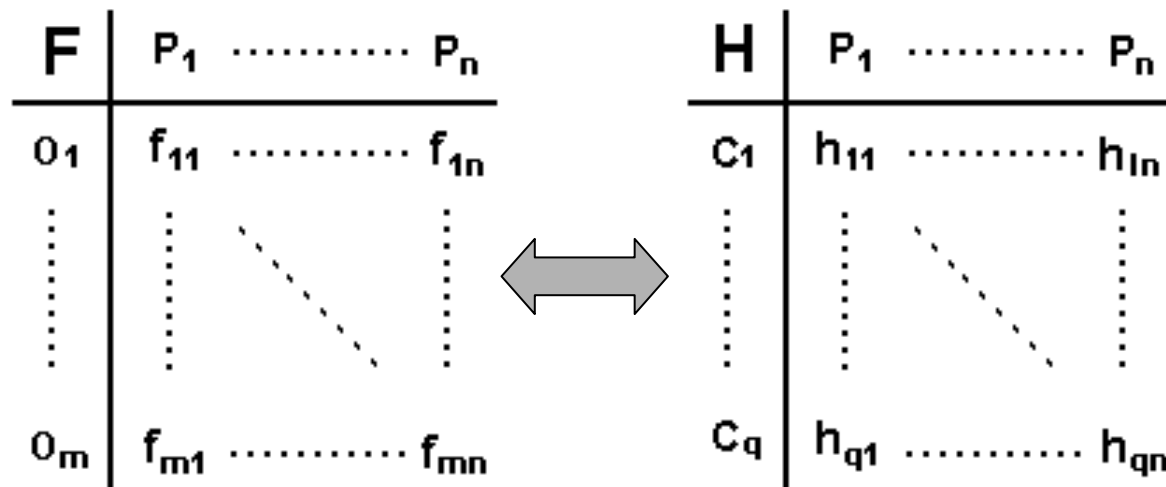


lamellar

secondary data:  
a / b

# JSM method of automatic hypothesis production

- 1) O - set of objects;
- 2) P - set of properties;
- 3) C - set of characteristics;



- 4)  $c \textcircled{O} o$  - "C is a characteristic of the object o";
- 5)  $c_1 \delta c_2$  - "c<sub>2</sub> is reacher than c<sub>1</sub>".



# The adaptation of JSM method to microstruct classification problem

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- 1)  $O$  – set of microsection images;
- 2)  $P$  – set of microstruct classes;
- 3)  $C$  – set of primary and secondary data obtained from microsection images;